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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 139)

MARCH 1975

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 139)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in February 1975 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MARCH 1975

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 242 reports, articles and other documents announced during February 1975 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Reports (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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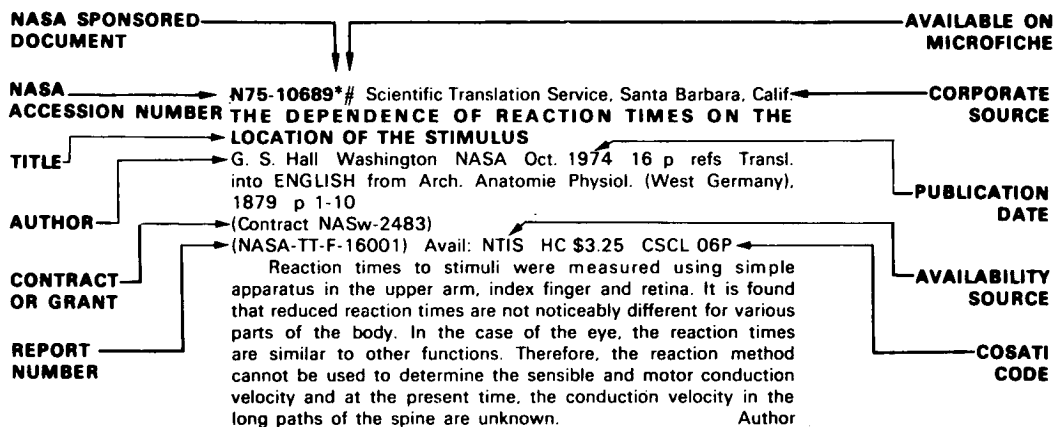
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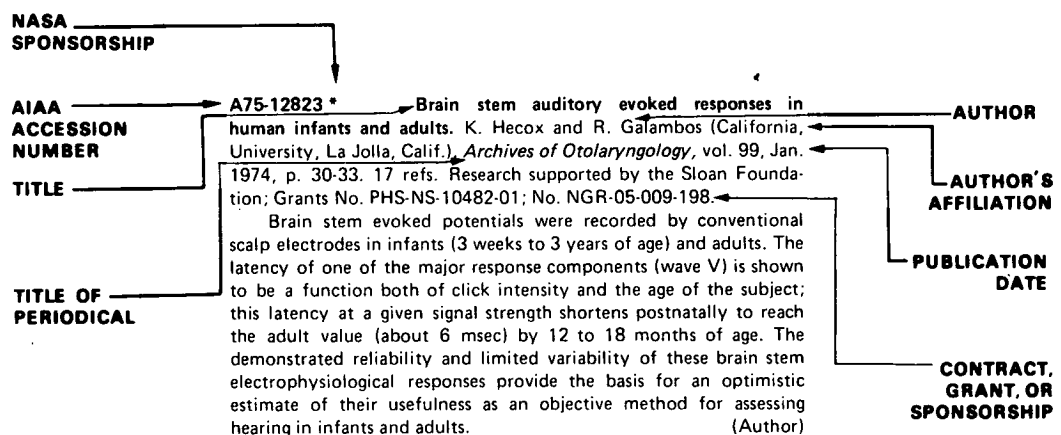
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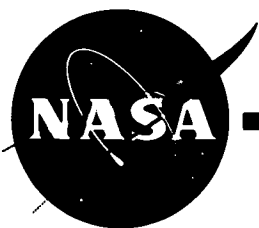
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TYPICAL CITATION AND ABSTRACT FROM *IAA*





AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 139)

MARCH 1975

IAA ENTRIES

A75-13246 # Influence of hypoxia on local blood circulation of the brain (Wplyw niedotlenienia na lokalny przepływ mózgowy). K. Niewiadomska-Skolasinska (Akademia Medyczna, Warsaw, Poland). *Postepy Astronautyki*, vol. 7, no. 1, 1974, p. 73-83. 37 refs. In Polish.

The influence of reduced partial oxygen pressure (at a constant p CO₂ level) on the circulation of the brain is studied on the basis of literature data. It is shown that hypoxia has the effect of changing microcirculation by acting indirectly on the vascular tunica muscularis, and directly through the sympathetic system. It also affects the autoregulation capacity of the brain vessels. V.P.

A75-13250 # Man in space orbit (Chelovek na kosmicheskoi orbite). S. P. Umanskii. Moscow, Izdatel'stvo Mashinostroenie, 1974. 140 p. 29 refs. In Russian.

Equipment and emergency devices and measures used by man in flights in various kinds of spacecraft are described. The design and operation of life support systems in spacecraft are described. Special equipment for transportation along the moon's surface, protection from meteoric material, and for shielding radiation is discussed. P.T.H.

A75-13305 # Cell-tissue changes in lymph nodes of loaded and immobilized rats. A. I. Khadzhiolov, T. M. Shivacheva, L. P. Chereshevarov, L. V. Lazarova, and S. I. Toshkova (B'lgarska Akademiia na Naukite, Institut po Morfologiya, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 27, no. 8, 1974, p. 1161, 1162. 6 refs.

A75-13399 # Evoked responses to heterogeneous stimuli combined in direct and reverse shifts in the sequence of paired stimuli (sochetanii raznokharakternykh razdrazhitelei v priamoi i obratnoi posledovatel'nosti). L. G. Bykova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 24, July-Aug. 1974, p. 743-749. 21 refs. In Russian.

Study of the changes in evoked potential (EP) characteristics induced in dogs by direct to reverse shifts in the sequence of paired stimuli, clicks, and low-frequency electrical stimulations of non-specific thalamic nuclei. The results include the finding that EP changes in response to stimulus sequence shifts consist mostly in a diminished amplitude of the basic EP components. M.V.E.

A75-13400 # Early changes in the excitability of the various levels of the visual system following a light flash (Rannie izmeneniia vzbudimosti raznykh urovnei zritel'noi sistemy posle svetovoi vspyski). I. P. Levshina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 24, July-Aug. 1974, p. 821-824. 11 refs. In Russian.

A qualitative resemblance is shown to exist between the excitability changes of the various levels (visual cortex, lateral geniculate body, tractus opticus, and optic radiation) of the visual system occurring after a light flash. An evaluation of the reactivity of the various visual structures by the threshold method yields results that are readily comparable with the course of the recovery cycle. It is suggested that the excitability change phenomenon may be due to the effects of a short-latency signal propagating throughout the visual system. M.V.E.

A75-13401 # Perception of the direction of sound in the case of nonsimultaneous termination of the stimulation of the right and left ear (Vospriatie napravleniia zvuka pri neodnorodovremennom okonchaniu stimulatsii pravogo i levogo ucha). N. Iu. Alekseenko and V. M. Kamenkovich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 24, July-Aug. 1974, p. 839-841. 9 refs. In Russian.

A75-13402 # Investigation of the cortical projection of the vestibular apparatus of rabbits (K izucheniiu korkovoi proektsii vestibuliarnogo apparata u krolikov). Iu. V. Kreidich. *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 24, July-Aug. 1974, p. 854-856. 9 refs. In Russian.

A75-13422 # Algorithm for identifying changes in the ST-interval of the ECG in the case of coronary insufficiency (Algorit'm za identifikatsiia na izmeneniia v ST-interval na EKG pri koronarna nedostat'chnost). Kh. R. Khristov, Ch. Nachev, G. Astardzhiiian, and L. Simeonova. *B'lgarska Akademiia na Naukite, Institut po Tekhnichesk Kibernetika, Izvestiia*, vol. 18, 1974, p. 151-162. 12 refs. In Bulgarian.

A75-13423 # Comparative analysis of deterministic and probabilistic methods in the study of rhythmic processes (Sravnitel'na analiz na deterministichni i veroiatnostni metodi pri izsledvane na rit'mni protsesi). T. Ianev and G. Astardzhiiian. *B'lgarska Akademiia na Naukite, Institut po Tekhnichesk Kibernetika, Izvestiia*, vol. 18, 1974, p. 163-172. 8 refs. In Bulgarian.

Comparative analysis of deterministic and probabilistic methods for studying cardiac arrhythmias reflected in sequences of R-R time

intervals on the ECG. The ranges of applicability of these methods are considered, and the advantages and disadvantages of each method are indicated. Taxonomic entropy characteristics are employed for probabilistic estimates of systemic cardiac arrhythmias. It is proposed that a combined deterministic and probabilistic method be employed to obtain a complex estimate of cardiac arrhythmias.

A.B.K.

A75-13424 # Configurational and histogram distribution of the ST-interval during standard loading (Konfiguratsionno i khistogramno razpredelenie na ST-interval pri standartno obremeniavane). T. Ianev, L. Simeonova, Kh. R. Khristov, and Ch. Nachev. *B'lgarska Akademiia na Naukite, Institut po Tekhnicheska Kibernetika, Izvestiia*, vol. 18, 1974, p. 173-183. In Bulgarian.

Analysis of the differences between histogram and configurational distributions of ST-intervals in ECG images of clinically healthy subjects during standard loading. The study was carried out with a discretization of the ST-interval at a small number of points (four) and amplitude sampling at nine quantum levels for each point. The measurement data were collected by both histogram and configurational methods for 19 subjects undergoing standard loading in five regimes. Histogram and configurational distributions of the ST-intervals were plotted for each patient according to regimes and as a whole for all the subjects tested. A comparative analysis of the histogram and configurational distributions for each patient and for the various regimes shows a 90% coincidence of the two distributions.

A.B.K.

A75-13570 Eye movements in scanning iconic imagery. D. C. Hall (Stanford Research Institute, Menlo Park, Calif.). *Journal of Experimental Psychology*, vol. 103, Nov. 1974, p. 825-830. 21 refs.

The results of a study of the relationship between eye movements and iconic imagery are shown to indicate that eye movement is a significantly associated psychophysiological correlate of iconic imagery. These findings are based on observations of the involvement of eye movements in the postperceptual processing of iconic imagery.

M.V.E.

A75-13571 Simulation of an object rotating in depth. Constant and reversed projection ratios. W. A. Hershberger, D. L. Carpenter, J. Starzec, and N. K. Laughlin (Northern Illinois University, DeKalb, Ill.). *Journal of Experimental Psychology*, vol. 103, Nov. 1974, p. 844-853. 15 refs. Grants No. PHS-1-R03-MH-2607-01; No. NIH-1-R01-EY-00979-01.

Review of the results of an experiment in which observers viewed two types of pseudopolar motion projections (i.e., moving pictures) of a row of dots rotating in depth about one end and sweeping through limited sectors devoid of previously identified cues to rotation direction. One type incorporated a stimulus gradient of displacement/acceleration ratios, the other type had no such gradient. The results obtained suggest that displacement/acceleration gradients in transformations of the retinal projection (image) mediate kinetic depth effects, i.e., are perceived as objective depth rather than objective motion.

M.V.E.

A75-13572 Backward masking and interference with the processing of brief visual displays. V. Di Lollo (Western Australia, University, Nedlands, Australia), D. G. Lowe, and J. P. Scott, Jr. (Trent University, Peterborough, Ontario, Canada). *Journal of Experimental Psychology*, vol. 103, Nov. 1974, p. 934-940. 11 refs.

Two spatially separate rows of letters were displayed in a tachistoscope either simultaneously or sequentially. A tone cue, indicating the row to be reported, was differentially timed so as to allow comparison of performance under the two modes of presentation at identical delays of cue. Performance on the temporally leading row was substantially impaired relative to performance on the corresponding row under simultaneous display conditions. It is suggested that the onset of the second display interferes with the processing of the first. Parallels with backward visual masking by a spatially superimposed pattern are noted.

(Author)

A75-13573 * Study and response time for the visual recognition of 'similarity' and identity. P. L. Derks (College of William and Mary, Williamsburg, Va.) and T. M. Bauer (Carnegie-Mellon University, Pittsburgh, Pa.). *Journal of Experimental Psychology*, vol. 103, Nov. 1974, p. 978-984. 17 refs. Grant No. NGL-47-006-008-G.

Four subjects compared successively presented pairs of line patterns for a match between any lines in the pattern (similarity) and for a match between all lines (identity). The encoding or study times for pattern recognition from immediate memory and the latency in responses to comparison stimuli were examined. Qualitative differences within and between subjects were most evident in study times.

M.V.E.

A75-13574 Mechanisms of control in motor performance - Closed-loop versus motor programming control. E. A. Roy and R. G. Marteniuk (Waterloo, University, Waterloo, Ontario, Canada). *Journal of Experimental Psychology*, vol. 103, Nov. 1974, p. 985-991. 24 refs. Research supported by the National Research Council of Canada.

Experimental study of the validity of the closed-loop theory and the motor program theory as explanations for the control of motor responses. The experiment involved 30 subjects learning to move a cursor along a track in 1 sec using a fast or slow response. The results obtained suggest that the motor programming theory explains performance control in the fast response, while closed-loop theory explains performance control in the slow response.

M.V.E.

A75-13598 # Adreno- and GABA-sensitive inhibiting systems in the internal synaptic layer of a frog retina (Adreno- i GAMK-chuvstvitel'nye tormoziaschie sistemy vo vnutrennem sinapticheskom sloe setchatki liagushki). N. A. Polishchuk and G. M. Zenkin (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Neirofiziologiya*, vol. 6, Sept.-Oct. 1974, p. 525-531. 23 refs. In Russian.

A75-13599 # Latent periods and simultaneity in discharges of visual and somatosensory cortex neurons in response to conditioned light flashes (Latentnye periody i sinkhronnost' razriadov neironov zritel'noi i somato-sensornoj kory v otvet na uslovniui vspysku sveta). Iu. I. Aleksandrov and V. B. Shvyrkov (Akademiia Nauk SSSR, Institut Psikholgii, Moscow, USSR). *Neirofiziologiya*, vol. 6, Sept.-Oct. 1974, p. 551-553. 9 refs. In Russian.

A75-13649 Does the start of polycythemia of mobilization take place under the form of 'all or nothing' (Le déclenchement de la polycythémie de mobilisation se fait-il sous forme de 'tout ou rien'). D. Andre. *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper ST74-13*. 28 p. In French.

Before an aggression, human beings have a behavior sometimes passive and sometimes active. Those whose attitude is active react by the struggle or avoidance. Whatever this reaction, the energetic expenditures mount considerably, and the organism simultaneously or successively sets in play its diverse possibilities to ensure the coverage of these expenditures. One of these possibilities is the creation of polycythemia to ensure the flow of oxygen to the cells. A study was made of the start of polycythemia under various atmospheric pressures, determining that the start of the mobilization is not made under 'all or nothing' premise but depends on the oxygen pressure in the arterial blood.

N.D.

A75-13729 # Medical investigations during flights of the spacecraft Soyuz-12, Soyuz-13, Soyuz-14 and the orbital station Salyut-3. N. N. Gurovskii, A. V. Eryonin, O. G. Gazenko, A. D. Egorov, I. I. Brianov, and A. M. Ganin. *International Astronautical*

Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-099. 14 p.

Medical experiments on the manned Soyuz-12, 13, and 14 and Salyut-3 missions aimed at collecting data on in-flight changes of the human body; especially in the early period of adaptation to weightlessness; studying means and methods of preventing undesirable effects of weightlessness; and improving the study of cardiovascular effects of weightlessness. Monitoring methods, cabin environmental parameters, and crew diet are considered. The Soyuz cosmonauts used gravity simulation suits, bungee cords for exercise, and anti-gravity suits (on reentry) as measures against undesirable effects of weightlessness. Refraining from abrupt movements during the adaptation period was effective for the Soyuz-14 crew. The in-flight heart rate and arterial pressure of the Salyut-3 crew showed great variability in the first 5-6 days and a general tendency to decrease below preflight levels. Rapid postflight recovery from the physiological effects of weightlessness showed the effectiveness of in-flight physical training apparatus, gravity-simulation suits, and the comfortable spacecraft. A.T.S.

A75-13730 * Medical results of the Skylab program. R. S. Johnston and L. F. Dietlein (NASA, Johnson Space Center, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-100. 53 p.*

The Skylab food system, waste management system, operational bioinstrumentation, personal hygiene provisions; in-flight medical support system, and the cardiovascular counterpressure garment worn during reentry are described. The medical experiments program provided scientific data and also served as the basis for real-time decisions on flight duration. Premission support, in-flight operational support, and postflight medical activities are surveyed. Measures devised to deal with possible food spoilage, medical instrument damage, and toxic atmosphere caused by the initial failures on the Orbital Workshop (OWS) are discussed. The major medical experiments performed in flight allowed the study of physiological changes as a function of exposure to weightless flight. The experiments included studies of the cardiovascular system, musculoskeletal and fluid/electrolyte balance, sleep, blood, vestibular system, and time and motion studies. A.T.S.

A75-13731 * # Susceptibility to motion sickness among Skylab astronauts. A. Graybiel, E. F. Miller, II (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.), and J. L. Homick (NASA, Johnson Space Center, Biomedical Research Office, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-102. 31 p. 36 refs. NASA Order T-81633.*

The mechanisms causing susceptibility to motion sickness in zero gravity are not well understood. Preflight and postflight motion sickness susceptibility tests conducted on the three Skylab crews are described. Under operational conditions, the first Skylab crew experienced no motion sickness, while the other two crews did. Susceptibility was greater in the Skylab workshop than in the command module. Weightlessness in itself is a unique motion environment. Changes occur in nonrigid body parts and in the response of macular receptors in the otolith organs. Tests in parabolic flight, where zero gravity is the only significant factor in motion sickness susceptibility, indicate that some people need to adapt to weightlessness and others do not. A comparison of all US and Soviet manned missions indicates that a headward shift of fluid on transition to zero gravity is not a predisposing factor in motion sickness. Under certain conditions after adaptation susceptibility was lower in the Skylab workshop than on the ground. The anti-motion sickness drugs used in Skylab are judged effective for prevention and treatment. A.T.S.

A75-13732 * Skylab crew health and changes related to space flight. W. R. Hawkins, E. C. Burchard, and J. R. Hordinsky

(NASA, Johnson Space Center, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-103. 8 p.*

All three manned Skylab missions were supported by a cadre of medical personnel who were responsible not only for the management and conduct of the medical experiments but also for the operational planning and crew health. The day-to-day medical care of the crewmen and their families was left to a team of flight surgeons who were responsible for the health care during all phases of the mission, as well as the development and use of the inflight medical support system. The preventive medicine aspects of the preflight and postflight health stabilization program are discussed. The clinical problems encountered are identified and the significance of these medical entities are reviewed. The inflight physiological changes of a clinical nature are discussed in light of the significance of these changes as result of the space environment. (Author)

A75-13733 Study of relationship between the content of carboxyhemoglobin in the blood and carbon monoxide in the exhaled air of test subjects and the carbon monoxide concentration in the chamber atmosphere. Iu. G. Nefedov, V. P. Savina, N. L. Sokolov, and E. I. Nikitin. *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-104. 11 p. 15 refs.*

A75-13734 Water and electrolyte balance in man consuming diets of pure nutrients and mineral supplements. Iu. G. Nefedov, Z. P. Pak, Iu. S. Koloskova, and V. G. Vysotskii. *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-105. 7 p. 6 refs.*

The diets and their chemical composition and cooking influence the fluid-electrolyte balance of man in space flight. It is possible that in certain flight situations diets composed of synthetic food substituting first of all the protein component can be used. In order to investigate the fluid-electrolyte metabolism of man who consumes the diet composed of synthetic nutrients, three experimental studies were carried out in which 26 test subjects participated. Through the water metabolism, and urine and feces excretion the protein content was analyzed. F.R.L.

A75-13735 # Fly behaviour of birds in weightlessness - A study of the tumble-phenomenon. W. J. Oosterveld and A. J. Greven (Amsterdam, Universiteit, Amsterdam, Netherlands). *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-106. 6 p.*

The flight behavior of pigeons was studied in zero-gravity conditions induced aboard aircraft for up to 15 seconds. Various restrictions on vision, leg movement, and head movement were tested. The pigeons' reactions are compared to those of mice, turtles, goldfish, and man. The experiments indicate that illusions induced by weightlessness in man and birds are similar. A.T.S.

A75-13737 # Complex of life-support systems on board the Cosmos 605 specialized biological satellite (Kompleks sistem zhizne-obespecheniia spetsializirovannogo biologicheskogo sputnika zemli 'Kosmos-605'). B. A. Adamovich, A. D. Noskin, V. S. Poleshchuk, and V. K. Ovcharov. *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-111. 14 p. In Russian.*

The block and structural diagrams of a complex of fully automatic life-support systems on board a biological satellite are discussed. The solutions chosen for the variety of tasks involving the life support of numerous test animals of various kind, each having its intrinsic specific requirements, and including such factors as the

isolation of dead animals from the cabin atmosphere are outlined.

V.P.

A75-13738 * Some recent developments in spacecraft environmental control/life support subsystems. R. J. Gillen (NASA, Johnson Space Center, Houston, Tex.) and T. M. Olcott (Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.). *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-112*. 63 p. 9 refs.

The subsystems considered include a flash evaporator for heat rejection, a regenerable carbon dioxide and humidity control subsystem, an iodinating subsystem for potable water, a cabin contaminant control subsystem, and a wet oxidation subsystem for processing spacecraft wastes. The flash evaporator discussed is a simple unit which efficiently controls life support system temperatures over a wide range of heat loads. For certain advanced spacecraft applications the control of cabin carbon dioxide and humidity can be successfully achieved by a regenerable solid amine subsystem. G.R.

A75-13739 # Some results of studying a simple bioregenerative life support system. E. Ia. Shepelev, G. I. Meleshko, V. I. Fofanov, and S. I. Tsitovich. *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-113*. 6 p.

A 29-day experiment with a human subject was conducted utilizing photosynthesis of *Chlorella* cultivated in association with microorganisms and microflora. The atmosphere was recycled 15 times in 30 experimental days. The degrees of closure obtained in the system were: 100% for oxygen, 8% for food, and 90% for water. It is found that a biological life support system is capable of functioning reliably and needs minor control due to inherent autocorrelation.

A.T.S.

A75-13744 * Viking heat sterilization Progress and problems. L. P. Daspit, E. M. Cortright (NASA, Langley Research Center, Hampton, Va.), and J. A. Stern (NASA, Langley Research Center; Bionetics Corp., Hampton, Va.). *International Astronautical Federation, International Astronautical Congress, 25th, Amsterdam, Netherlands, Sept. 30-Oct. 5, 1974, Paper 74-119*. 10 p.

The Viking Mars landers to be launched in 1975 will carry experiments in biology, planetology, and atmospheric physics. A terminal dry-heat sterilization process using an inert gas was chosen to meet planetary quarantine requirements and preclude contamination of the biology experiment by terrestrial organisms. Deep sterilization is performed at the component level and terminal surface sterilization at the system level. Solutions to certain component problems relating to sterilization are discussed, involving the gyroscope, tape recorder, battery, electronic circuitry, and outgassing. Heat treatment placed special requirements on electronic packaging, including fastener preload monitoring and solder joints. Chemical and physical testing of nonmetallic materials was performed to establish data on their behavior in heat-treatment and vacuum environments. A Thermal Effects Test Model and a Proof Test Capsule were used. It is concluded that a space vehicle can be designed and fabricated to withstand heat sterilization requirements.

A.T.S.

A75-13845 Survivability of microorganisms in space and its impact on planetary exploration. M. Frankenberg-Schwager, H. Bucker, and H. Wollenhaupt (Arbeitsgruppe für biophysikalische Raumforschung, Frankfurt am Main, West Germany). *Raumfahrt-forschung*, vol. 18, Sept.-Oct. 1974, p. 209-212. 13 refs.

A survey of some investigations on the survivability of microorganisms in space environment and studies on the effect of simulated space factors (extreme temperature, vacuum and UV-radiation) on microorganisms are presented. The results of these investigations indicate that terrestrial microorganisms can tolerate extreme environmental conditions and dispose on repair mechanisms

to eliminate damages induced by this extreme environment. The implication of these findings on the exploration of Mars is discussed. (Author)

A75-13891 * Arousal and hallucinatory activity under two isolation conditions. J. Levin (City University, New York, N.Y.). *Perceptual and Motor Skills*, vol. 39, Aug. 1974, pt. 2, p. 443-450. USAF-supported research; Grant No. NGR-46-001-008.

Experimental exploration of the hypothesis that soundproof-room and water-immersion isolation environments differ with respect to the variety of physiological responses and reported hallucinations they elicit. The results obtained support the hypothesis in regard to physiological responses only.

M.V.E.

A75-13892 Effect of white noise on attention as a function of manifest anxiety. S. A. Basow (Brandeis University, Waltham, Mass.). *Perceptual and Motor Skills*, vol. 39, Aug. 1974, pt. 2, p. 655-662. 16 refs.

Investigation of the effect of white noise on attention-task performance as a function of the manifest anxiety level in 30 male undergraduates, with concurrent physiological recordings made. The results include the findings that noise has no lasting effect on heart rate, skin potential, or attentional performance in general, and that noise may act either as a distractor or as a behavioral arouser. M.V.E.

A75-13901 Stimulus configuration and line orientation in the horizontal-vertical illusion. E. O. Cormack and R. H. Cormack (New Mexico Institute of Mining and Technology, Socorro, N. Mex.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 208-212. 20 refs.

The horizontal-vertical illusion (HVI) for 40 subjects was measured by the method of average error used with a mixed design and the results were discussed in relation to the perspective theory of visual illusion. Six stimulus configurations were combined with seven angular orientations of the upright standard. On each trial the variable horizontal was adjusted to appear equal to the standard in length. The absence of asymmetric effects within the L and the side T figures showed specific stimulus conditions to be the source of right-left differences in tilt effects. It was also shown that the vertical orientation of the standard does not yield the greatest illusion for any stimulus configuration. Greater perspective effects and greater HVI magnitudes were generated by upright inclinations. T.S.

A75-13902 Channels and order of report in dichotic memory. S. R. Parkinson, M. V. Knight, J. C. DeMaio, and J. F. Connors (Arizona State University, Tempe, Ariz.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 235-241. 9 refs. Contract No. F41609-72-C-0037.

Experiments were conducted to investigate the relation between channels in which subjects binaurally received to-be-remembered sequences of two, three, or four simultaneous pairs of digits. It was found that even in the absence of channels sequential reporting is the preferred order of report based on spatial location and voice using two pairs of digits. Under conditions of rapid presentation some of the individual samples reported temporally or pair-by-pair. Subjects showed that a majority of the pair-by-pair reports were found in four different digit-span groups. T.S.

A75-13903 The temporal course of the relationship between retinal disparity and the equidistance tendency in the determination of perceived depth. D. A. Owens and E. R. Wist (Franklin and Marshall College, Lancaster, Pa.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 245-252. 18 refs. NSF Grant No. GY-8761; Grant No. NIH-02268.

Charges in perceived depth as a function of exposure duration were compared for two stimulus conditions. In one, a depth interval between two points of light was produced by the retinal disparity cue, and in the other condition, otherwise identical to the first, the light points were connected by a thin luminous line. The principle finding was that the perceived depth interval between the light points increased as a function of exposure durations greater than 1 sec, while no change in the perceived depth interval between the end points of the line occurred. The results were interpreted in terms of a greater equidistance tendency (ET) operating for the line than for the point condition. It was concluded that both the ET and the retinal disparity cue increase in strength as a function of exposure duration. (Author)

A75-13904 * **Visual search in a forced-choice paradigm.** J. E. Holmgren (Maryland, University, College Park, Md.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 253-258. 8 refs. Grant No. NGR-05-020-244.

The processing of visual information was investigated in the context of two visual search tasks. The first was a forced-choice task in which one of two alternative letters appeared in a visual display of from one to five letters. The second task included trials on which neither of the two alternatives was present in the display. Search rates were estimated from the slopes of best linear fits to response latencies plotted as a function of the number of items in the visual display. These rates were found to be much slower than those estimated in yes-no search tasks. This result was interpreted as indicating that the processes underlying visual search in yes-no and forced-choice tasks are not the same. (Author)

A75-13905 **On the ambiguity of visual stimulation - A reply to Eriksson.** R. R. Rosinski (Pittsburgh, University, Pittsburgh, Pa.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 259-263. 22 refs.

In a recent note, Eriksson criticized Gibson's theory by arguing that visual perception of distance is not solely a function of optical stimulation. It is shown here that the optic array does specify distance, and that the limitations of visual information are precisely defined in the theory. Visual information alone is insufficient when judgments in arbitrary metric units are required. The limitation of the theory is not in the specification of potential and effective information, but in the description of the observer's response to that information. (Author)

A75-13906 **On the distinction between sensory storage and short-term visual memory.** W. A. Phillips (Stirling University, Stirling, Scotland). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 283-290. 30 refs.

Three experiments were conducted to study the effects of pattern complexity, pattern movement, and masking over a range of interstimulus intervals (ISI). Results support the view that sensory storage and short term visual memory (STVM) are distinct in nature. High-capacity sensory storage is tied to spatial position and it is maskable and brief. Schematic STVM is not tied to spatial position and it is protected against masking. It becomes less effective over the first few seconds but not over the first 600 msec. Sensory representation is found to be retinally fixed and unable to integrate input for successive fixation. T.S.

A75-13907 **Aftereffect of inspection of a perspectival stimulus for slant depth - A new normalization effect.** W. Epstein and C. L. Morgan-Paap (Wisconsin, University, Madison, Wis.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 299-302. 10 refs. Grant No. NIH-MH-16390.

A75-13908 **Measuring human aversion to sound without verbal descriptors.** J. A. Molino (National Bureau of Standards, Institute for Basic Standards, Washington, D.C.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 303-308. 23 refs.

Three experiments were designed to demonstrate the possibility of making a psychophysical determination of human auditory

aversion levels for sounds without the use of verbal descriptors. The first experiment showed that for different acoustic stimuli the average maintained SPL becomes asymptotic after four minutes to permit a measurement of equal aversion levels for the stimuli. In experiment two, the starting intensity level was varied over a range of 50 dB and the differences in the asymptotic intensity levels observed after six minutes were not significant. The last experiment showed no apparent significant change in the aversion threshold when the number of responses required to produce a 1-dB intensity decrement in a 1000-Hz tone were varied. T.S.

A75-13909 **Learning to utilize information presented over two sensory channels.** J. Halpern (Denver, University, Denver, Colo.) and A. E. Lantz (Denver Research Institute, Denver, Colo.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 321-328. 10 refs. Navy-supported research.

Three separate experiments were conducted to demonstrate the role of learning in bisensory information processing and to detail the effects of certain parameters of this learning. Subjects were confronted with a classification task with unfamiliar dynamic stimulus information presented either auditorially, visually, or both auditorially and visually for 2.5 or 5 second durations. Results indicate that the most prominent bisensory stimulus components were extracted by subjects from the auditory and visual information into a unidirectional information configuration. T.S.

A75-13910 **Intensity effects of the auditory evoked brain response to stimulus onset and cessation.** P. K. Schweitzer and D. I. Tepas (St. Louis University, St. Louis, Mo.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 396-400. 10 refs.

A75-13911 **Human sensory dominance.** F. B. Colavita (Pittsburgh, University, Pittsburgh, Pa.). *Perception and Psychophysics*, vol. 16, Oct. 1974, p. 409-412. 9 refs. Grant No. PHS-NS-09027-03.

Four experiments were conducted using human subjects and the results of auditory and visual modalities as to sensory prepotency were compared. All of the experiments showed obvious prepotency of the visual over the auditory stimulus persisting across a variety of experimental conditions which included giving subjects a verbal signal to respond to the tone when both stimuli were presented simultaneously. T.S.

A75-13952 **Autonomic and behavioral temperature regulation - Unilateral vs bilateral preoptic thermal stimulation.** E. R. Adair and R. O. Rawson (Yale University, New Haven, Conn.). *Pflügers Archiv*, vol. 352, no. 2, 1974, p. 91-103. 25 refs. Grants No. NIH-HE-12038; No. PHS-ES-00354; No. PHS-NS-11517.

A75-14079 **Additional heart rate - An indicator of psychological activation.** A. S. Blix (Royal Norwegian Air Force, Blindern, Oslo, Norway), S. B. Stromme (Norwegian College of Physical Education and Sport, Oslo, Norway), and H. Ursin (Bergen, Universitetet, Bergen, Norway). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1219-1222. 21 refs.

Heart rate and oxygen consumption of helicopter and transport aircraft pilots were measured. During flight operations, the heart rate accelerated without a corresponding increase in oxygen consumption. This heart rate increase beyond that expected from the oxygen uptake - i.e., additional heart rate - is therefore used as an indicator of psychological activation. This activation did not depend only on the actual task, but also on the experience level of the pilot himself. The levels of heart rate (and blood pressure) recorded indicate that even routine missions may impose a hazard to pilots with unmanifested or latent heart failure. This obviously calls for frequent workload-ECG examinations of flying personnel. (Author)

A75-14080 Effect of chronic exposure to cold, hypoxia, and both combined on water exchange in rats. M. J. Fregly, L. O. Lutherer, and P. E. Tyler (Florida, University, Gainesville, Fla.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1223-1231. 39 refs. Contract No. N00014-68-A-0173-0007.

The effect of combined cold (5 C air) and hypoxia (14% oxygen in nitrogen) on water exchange was studied using 24 male rats divided into four equal groups. Group 1 served as control, while group 2 was exposed to 14% oxygen, group 3 to air at 5 C, and group 4 to both. All measurements continued during a 30-day experimental period. Regression analysis of water intake on urine output revealed that at a given water intake, all three treated groups excreted significantly more urine than controls. No significant differences occurred among treated groups. Dehydration was carried out on the 28th day of the experiment to assess renal concentrating ability. Both the cold- and cold-hypoxia-treated groups failed to reduce urine volume to that of controls. These same groups also showed little change in urine output in response to subcutaneous administration of 300 mU of Pitressin tannate in oil, whereas both the control and hypoxia-treated groups showed a significant decrease. (Author)

A75-14081 Relationship between flight experience and vestibular function in pilots and nonpilots. U. Brandt, E. Fluor, and M. Z. Zylberstein (Kardinska Sjukhuset, Stockholm, Sweden). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1232-1236. 15 refs.

Fifteen subjects without experience of flight and 18 experienced military pilots were rotated in a modified Stille-Werner CF 10 rotating chair with head and body 1 m from the rotating center. Two positions were used: heading forward and heading centripetally. The task of the subjects was to estimate the apparent change in space of a luminous cross movable in the three axes of the space. In the first position, both groups underestimated the inclination of the resultant vector. In the other position, the pilots underestimated the inclination and the nonpilots overestimated it, but the difference is not statistically significant. If the results of the pilots are plotted against their amount of flight hours, there is a clear correlation between the flight training and the capacity to give a correct response. (Author)

A75-14082 Passive dosimetry measurements on board the Skylab II mission. L. F. Wailly, M. F. Schneider, J. F. Janni, A. D. Grimm, and G. C. Ainsworth (U.S. Air Force Academy, Colorado Springs, Colo.; USAF, Los Angeles, Calif.; USAF, Weapons Laboratory, Kirtland AFB, N. Mex.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1237-1243. 13 refs.

Passive dosimeter packages were located at five stations in Skylab II and consisted of arrays of thermoluminescent devices, ionization chambers, and activation foils. Film emulsions and heavy particle track detectors are also included. There was a relative lack of appreciable softer/bremsstrahlung X rays within the Command Module. The results indicate no measurable neutron contribution over the range .025 eV-10 keV. It was confirmed that there is no dose buildup with increased shielding. Radiation levels recorded consisted of about 90% penetrating protons. The earth's magnetic field provides sufficient shielding for astronaut safety from solar flare activity in the Skylab orbit. Limited orbital time is the only solution for higher altitude manned operations. The Skylab II dose levels exceeded those on Gemini IV, due to higher altitude and inclination. Doses on Skylab III, while above the 100 mrad/week allowable for routine earth-based operation, will not produce measurable clinical damage. A.T.S.

A75-14083 * Postflight analysis of bacillus thuringiensis organisms exposed to spaceflight conditions on Apollo 16. R. C. Simmonds (NASA, Ames Research Center, Flight Experiments Office, Moffett Field, Calif.), R. T. Wrenn, A. M. Heimpel, and G. R. Taylor (NASA, Johnson Space Center, Life Sciences Directorate, Houston, Tex.; U.S. Department of Agriculture, Agriculture Re-

search Center, Beltsville, Md.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1244-1247. 10 refs.

A75-14084 * Effect of a prolonged stay in a locked environment on the microbial flora in dogs. E. Balish, C.-N. Shih, C. E. Yale, and A. D. Mandel (Wisconsin, University, Madison, Wis.; NASA, Ames Research Center, Moffett Field, Calif.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1248-1254. 14 refs. NASA-supported research.

Ten purebred Beagle dogs (all males) were used to determine the effect of a prolonged stay in a locked environment (i.e., no exogenous microbial contamination) on the microbial flora. At monthly intervals the microbial profile (feces, nose, and throat) of each dog was assessed. After 12 months it was found there was no drastic alteration or simplification of the microbial profile of isolated or control dogs. Although isolated dogs had slightly higher levels of anaerobic bacteria and somewhat lower levels of enterococci, the major groups of anaerobic, aerobic, and facultative bacteria remained qualitatively and quantitatively similar for the 12-month study period. Although they were only minor components of the fecal flora, *Candida albicans* and *Shigella sonnei* were consistently isolated in larger numbers from the dogs in the locked environment. (Author)

A75-14085 * Behavioral effects of artificial gravity - Equivalence of rotation rate and radius in controlling gravity-avoidance behavior. F. C. Clark (Mississippi, University, University, Miss.), R. E. Belleville (National Institutes of Health, National Institute of Drug Abuse, Rockville, Md.), and K. O. Lange. *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1261-1266. 12 refs. Grants No. NGL-18-001-003; No. NGR-34-003-041.

A75-14086 Elicitation of vestibular side effects by regional vibration of the head. J. R. Lackner (Brandeis University, Waltham, Mass.) and A. Graybiel (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1267-1272. 8 refs. Navy Project MR041,01,01-0120.

Vestibular side effects including visual and postural illusions, nystagmus, and motion sickness were elicited using a vibrator (held either by the subject or experimenter) applied to different regions of the head. Although a commercially available vibrator (60 Hz, 120 pulses/s) can elicit side effects, its use was enhanced by varying the vibration frequency and optimizing the stimulus conditions. Both horizontal and vertical nystagmus were elicited, the latter inconsistently. A strong apparent movement (and displacement) of a dimly lighted target that resembled the oculogyral illusion and apparent self-motion were consistently elicited. Motion sickness was readily evoked in some subjects; other subjects were immune, although the periods of stimulation were brief. The findings indicate that the use of a vibration stimulus should be exploited from the theoretical and practical viewpoints. (Author)

A75-14087 Age of red blood cells destroyed by in vivo hyperoxia. R. L. Carolla, L. H. Brubaker, and C. E. Mengel (Missouri, University, Columbia, Mo.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1273-1275. 11 refs.

The present studies were undertaken to identify a population of red blood cells (RBCs), by age, which was more susceptible to lysis of RBCs by hyperoxia. Tocopherol-deficient and chow-fed mice were injected with Fe-59 citrate. Seven days later the same mice were injected with Fe-55 citrate. Three days after this injection, mice were exposed to hyperoxia. After hyperoxia, serial determinations of hematocrit appearance of plasma, and specific activities of the isotopes in cells and plasma were made. No significant changes were observed in chow-fed mice. Immediately after hyperoxia, tocopherol-deficient mice had normal hematocrits. As hemolysis evolved, a five-fold increase of Fe-59 activity ('early' label) in plasma was observed with concomitantly decreased activity in remaining RBCs. No significant change of Fe-55 activity was noted in plasma or RBCs. (Author)

A75-14088 Kugel's artery as a major collateral channel in severe coronary disease. A. J. Thompson and V. F. Froelicher (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1276-1280. 9 refs.

A 52-year-old asymptomatic man was evaluated with left heart catheterization and coronary angiography because of an abnormal response to exercise testing. His functional and aerobic capacity were exceptional. The left ventricular angiogram and left ventricular EDP were completely normal in spite of total occlusion of the right coronal artery (RCA) and left circumflex and 90% narrowing of the proximal left anterior descending coronary artery. Kugel's artery was demonstrated by cineangiography as an important source of collateral flow from the proximal to distal RCA. (Author)

A75-14089 # Unique facets of the specialty of aerospace medicine. R. Moser, Jr., J. C. Davis, and R. D. Hansen (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1281-1285. 9 refs.

A discussion of the objectives of the Air Force Aerospace Medicine Residency Program is presented. This discussion serves to delineate many of the unique aspects of the specialty of aerospace medicine and also emphasizes those qualifications possessed only by the specialist in this field of medicine. The nature of present and future challenges in the specialty is also considered. (Author)

A75-14090 Psychiatric interventions with amnesic aircraft accident survivors. P. B. Hoffmann and A. M. Faris, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1286-1290. 30 refs.

Aircraft accident survivors who later develop retrograde amnesia for the circumstances of their crashes present unique problems in terms of psychiatric treatment and valid accident investigation. The authors explore the complexities of treating such patients within the limitations of our present understanding of amnesic disorders and raise questions concerning medicolegal issues of informed consent, confidentiality, and validity of information recalled during the treatment process. (Author)

A75-14091 Drug effectiveness on experimental optokinetic and vestibular motion sickness. T. Brandt, J. Dichgans, and W. Wagner (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1291-1297. 35 refs.

The effectiveness and mode of action of some anti-motion-sickness drugs on optokinetic vestibular Coriolis effects caused by actual body rotation and also through optokinetic pseudo Coriolis effects evoked by head movements during illusory body rotation was tested. Two drugs, one an antihistamine, dimenhydrinate, and the other a belladonna-alkaloid, scopolamine were used for a double-blind examination against a placebo. Measurements were obtained of the vestibular nystagmus threshold, post-rotational nystagmus intensity and duration, subjective acceleration threshold, peak velocity of saccadic eye movements, blood pressure, heart and respiratory rates, and performance on psychological efficiency tests. For evaluating the effectiveness of anti-motion-sickness drugs the most reliable new method was found to be the magnitude of estimation of tilt and nausea in the Coriolis effects. T.S.

A75-14092 # Airborne blood pressure measurement using ultrasonics. H. D. Kopczynski (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Nov. 1974, p. 1307-1309. 5 refs.

A method using ultrasonic monitoring that employs the Doppler shift principle to detect blood flow and arterial wall motion was developed by the USAF School of Aerospace Medicine. The in-flight blood pressure measurement device consists of a commercial ultrasonic Doppler shift monitor and a standard sphygmomanometer which has been modified by placing a transducer mount through the

cuff and bladder. Its use is very similar to that of an acoustic stethoscope and sphygmomanometer; however, systolic and diastolic values are determined by monitoring arterial wall motion rather than detecting Korotkoff sounds. This device has proven to be extremely effective in eliminating the effects of in-flight noise and vibration, and is sufficiently sensitive to determine blood pressure of patients in shock. (Author)

A75-14199 # Bionic aspects in the structure of filtering optoelectronic preprocessors (O bionicheskikh aspektakh postroeniia fil'truishchikh optoelektronnykh preprotssorov). S. V. Svechnikov, M. A. Popov, and A. M. Shkvar (Akademiia Nauk Ukrainskoi SSR, Institut Poluprovodnikov, Kiev, Ukrainian SSR). *Poluprovodnikovaia Tekhnika i Mikroelektronika*, no. 17, 1974, p. 81-88. In Russian.

The paper examines theoretical aspects underlying optoelectronic systems for detecting a useful signal on a background of spatially distributed noise. The structure of these functional systems is founded upon the principle of information conversion in optical analyzer of biological systems. Results from mathematical and experimental simulation of spatial and adaptive time-dependent processing of information are included. T.S.

A75-14204 Blood velocity measurements in human retinal vessels. T. Tanaka (MIT, Cambridge, Mass.), C. Riva, and I. Ben-Sira (Retina Foundation, Boston, Mass.). *Science*, vol. 186, Nov. 29, 1974, p. 830, 831. 6 refs. Research supported by the Research to Prevent Blindness, Inc. and General Electric Foundation; Grants No. PHS-EY-54465; No. PHS-EY-01242-01; No. PHS-EY-01303-01; No. PHS-HL-14322-01.

Laser Doppler velocimetry was used to measure the velocity of blood in human retinal vessels. The mean flow velocities obtained were 1.9 centimeters per second in a retinal vein and 2.2 centimeters per second in a retinal artery. Scattered light from a weak helium-neon laser beam focused on the vessel was detected by a photomultiplier, and the temporal correlation of the intensity fluctuations was measured with a photon counting autocorrelator. Autocorrelation functions for blood flowing through glass capillaries were used for calibration. (Author)

A75-14205 * Chemical evolution and the origin of life - Bibliography supplement 1972. M. W. West, E. D. Gill (San Jose State University, San Jose, Calif.), B. Sherwood, and K. A. Kvenvolden (NASA, Ames Research Center, Moffett Field, Calif.). *Origins of Life*, vol. 5, 1974, p. 507-527.

A75-14329 # Application of engineering heat transport concepts to the analysis of biological thermoregulatory systems. C. E. Huckaba (Columbia University, New York, N.Y.). In: *Heat transfer 1974; Proceedings of the Fifth International Conference*. Tokyo, Japan, September 3-7, 1974. Volume 6. Tokyo, Society of Heat Transfer of Japan, 1974, p. 72-88. 67 refs.

A historical background of studies of biological thermoregulatory systems is provided. A new approach considered for the quantitative study of biological control mechanisms makes use of basic engineering techniques. An investigation is conducted of the controlled and the controlling systems, giving attention to the metabolic response, the sudomotor response, and the vasomotor response. Details regarding the theoretical mechanisms in thermoregulation are discussed along with experimental work. G.R.

A75-14387 Neural coding and psychophysical discrimination data. R. D. Luce (California, University, Irvine, Calif.) and D. M. Green (Harvard University, Cambridge, Mass.). *Acoustical Society of America, Journal*, vol. 56, Nov. 1974, p. 1554-1564. 24 refs. NSF-supported research.

Data from first-order auditory fibers are modeled as a simple renewal process. The interarrival times of neural spikes are treated as a geometric process at multiples of the period of the input signal modified by some temporal jitter, characterized as a frequency-dependent random variable with a standard deviation proportional to a small fraction of the period of the waveform. Two classes of models are considered: a timing model in which psychophysical decisions are based on the time taken to obtain a predetermined number of counts on many parallel channels, and a counting model in which psychophysical decisions are based on the number of neural events that occur within some fixed time on many parallel channels. Existing data, both for intensity and frequency, are sufficiently consistent to reject the timing model (which one would expect from other considerations), but they are not sufficiently consistent to provide either a strong test of the counting model or sharp estimates of the parameters of the model. (Author)

A75-14388 **Response patterns of cochlear nucleus neurons to excerpts from sustained vowels.** T. J. Moore (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio) and J. L. Cashin, Jr. (Dayton, University, Dayton, Ohio). *Acoustical Society of America, Journal*, vol. 56, Nov. 1974, p. 1565-1576. 25 refs. Contract No. F33615-72-C-1600.

Excerpts from sustained vowels as well as pure-tone bursts were used as input signals to the guinea pig's auditory nervous system. Single unit responses to these signals were recorded from the cochlear nucleus. The results indicated that a neuron's response pattern to a particular vowel was determined by the ratio of the vowel's spectral energy that fell within the excitatory and inhibitory areas of the neuron. Addition of energy in a neuron's inhibitory region resulted in major modifications in the response of the neuron to both vowels and sinusoidal inputs. Generally, the addition of inhibitory energy resulted in a 'temporal sharpening' of the response pattern. (Author)

A75-14584 # **Vector display of cardiac performance - A new approach for evaluating ventricular function.** R. A. Arcilla, P. Sodt, and R. Replogle (Chicago, University, Chicago, Ill.). *Cardiology*, vol. 59, no. 2, 1974, p. 102-113. 16 refs. Research supported by the Chicago Heart Association; Grant No. NIH-RR-305.

Cardiac performance analysis consisting of X-Y display of ventricular pressure and flow or of their derivatives, in the form of vector loops is described. Three vector loops are described: pressure-flow (P-F) loop, pressure-pressure derivative (P-dP/dt) loop, and pressure-flow acceleration (P-dF/dt) loop. Information from these loops include: stroke power, stroke work, initial impedance to ventricular ejection, and time-course of flow and flow acceleration during early ejection. In addition, (dP/dt)/P at the onset of systole is derived from the P-dP/dt loop to estimate the force generating power of the ventricle as an expression of myocardial contractility. (Author)

A75-14723 **Acid-base balance and subjective feelings of fatigue during physical exercise.** A. J. Poulus, H. J. Docter, and H. G. Westra (Amsterdam, Universiteit, Amsterdam, Netherlands). *European Journal of Applied Physiology*, vol. 33, no. 3, 1974, p. 207-213. 38 refs.

Six trained male subjects performed exercise on a bicycle ergometer. The external load was increased every minute by 10 watts until exhaustion. The subjects quantified their subjective feeling of fatigue by means of a rating scale. Parameters of acid-base balance (pH, CO₂ pressure) were determined in arterial blood from the a. brachialis. Correction of the acidemia by infusion of NaHCO₃(8%) during exercise had no effect on the subjective feeling of fatigue, and except for carbon dioxide output no effect on some important physiological functions (heart rate, blood pressure, ventilation, and oxygen consumption) during submaximal and maximal exercise. (Author)

A75-14724 **Effects of hypoxic training on normoxic maximal aerobic power output.** C. T. M. Davies and A. J. Sargeant (London School of Hygiene and Tropical Medicine, London, England). *European Journal of Applied Physiology*, vol. 33, no. 3, 1974, p. 227-236. 23 refs.

The paper discusses the influence of hypoxia on maximal aerobic power output. One leg submaximal and maximal exercise was studied in four male subjects before and after a five week training program where each subject was used as his own control. The effects of hypoxia as a training stimulus for the improvement of maximal aerobic power output measured under normoxic conditions was evaluated. Results showed no clear evidence that hypoxia has either an additive or potentiating effect with exercise on the improvement of aerobic power output. T.S.

A75-14725 **The effect of increased body temperature due to exercise on the heart rate and on the maximal aerobic power.** R. Mostardi, A. Veicsteinas, R. Margaria (Milano, Università, Milan, Italy), and R. Kubica. *European Journal of Applied Physiology*, vol. 33, no. 3, 1974, p. 237-245. 24 refs. Research supported by the Consiglio Nazionale delle Ricerche.

The paper investigates whether an increase in body temperature due to prolonged heavy exercise has an effect on heart rate and on the maximum aerobic power without external heat load interference. Ventilation and heart rate tend to increase rapidly at the beginning of exercise. The rate then decreases but a true plateau is never reached. Body temperature increases more gradually without reaching a steady value. The average increase in body temperature is 1.2 C. Oxygen consumption remains essentially constant throughout the exercise period. The increase in heart rate with increasing body temperature is 17.5 b/min per degree C at a lower load, and 7.5 b/min per degree C at the highest working load. It is concluded that the rate of heart rate increase with increasing work load is not a constant characteristic of a single individual. T.S.

A75-14749 # **Certain compensator-adaptive reactions of the circulatory apparatus during prolonged hypokinesia (Deiaki kompensatorno-pristosovni reaktsii aparata krovoobigu pri trivallii gipokinezii).** L. I. Zhukovskii and E. O. Dukhin. *Akademiia Nauk Ukrain'skoi RSR, Visnik*, vol. 38, Oct. 1974, p. 38-44. 36 refs. In Ukrainian.

Results of a clinical study of a number of healthy subjects under conditions of hypokinesia and a number of patients suffering from bone and joint tuberculosis. It is shown that in patients suffering from tuberculosis lesions of the bone and joint apparatus who remain under conditions of prolonged bed rest profound disturbances of the activity of the circulatory system occur. They consist in a reduction of the reserve capacities of the circulatory apparatus and a predominance of the heart component in the circulation structure. A.B.K.

A75-14800 * **Temperature responses of exercising dogs to infusion of electrolytes.** J. E. Greenleaf (Polska Akademia Nauk, Centrum Badan Medycznych, Warsaw, Poland; NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif.), S. Kozlowski, K. Nazar, H. Kaciuba-Uscilko, and Z. Brzezinska (Polska Akademia Nauk, Centrum Badan Medycznych, Warsaw, Poland). *Experientia*, vol. 30, 1974, p. 769, 770. 6 refs.

The effect of infusions with solutions of various ionic and osmotic composition on exercise temperature responses was studied in dogs who do not regulate their temperature by sweating. The results suggest an association between plasma Na⁺ and Ca⁺⁺ level within the normal physiological range and the control of body temperature during exercise. T.M.

A75-14849 # Typological characteristics of adaptation determining the efficiency of work activity (Tipologicheskie osobennosti adaptatsii, opredelivushchie effektivnost' trudovoi deiatel'nosti). A. M. Zingerman, V. D. Volkova, D. N. Menitskii, P. V. Bundzen, and B. M. Shishkin (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Oct. 1974, p. 1481-1493. 28 refs. In Russian.

Experimental data are presented on the determination of individual characteristics of human subjects in the process of tracking signals of varying complexity. A comparison is made of results obtained with the aid of known physiological indices and psychological tests with a new criterion - control stability - developed on the basis of methods in automatic control theory. Results have significance for the prognostic estimation of the successfulness and safety of work. P.T.H.

A75-14850 # The 24-hour rhythm of biogenic amines in man in the normal state and during hypoxia (Sutochnyi ritm biogennykh aminov u cheloveka v norme i pri gipoksii). I. L. Vaisfel'd, R. F. Il'icheva, and G. N. Kassil' (Akademiia Nauk SSSR, Laboratoriia Problem Upravleniia Funktsiiami Organizma Cheloveka i Zhivotnykh, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Oct. 1974, p. 1540-1547. 18 refs. In Russian.

The 24-hour rhythm in the metabolism of histamine and serotonin was studied in healthy subjects. The histamine system is characterized by the presence of 24-hour fluctuations in diamine oxidase activity in the blood and in the excretion of histamine with urine. Two peaks in the curve are noted. Similar relations are observed in the excretion of 5-oxyindoleacetic acid. It is suggested that these fluctuations are a criterion for organism resistance to stress factors. P.T.H.

A75-14851 # Effect of cooling in a hermetically sealed chamber on the free fatty acid content in an organism (Vlianie okhlazhdeniia v germokamere na sodержanie svobodnykh zhirnykh kislot v organizme). N. V. Korostovtseva, V. I. Baev, E. I. Bulakh, and T. D. Makarevich (Leningradskii Pediatrikheskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Oct. 1974, p. 1601-1605. 16 refs. In Russian.

It was observed in rats placed in a cooled, hermetically sealed chamber under conditions of increasing hypoxia and hypercapnia that the use of free fatty acids in brain and liver tissues and in skeletal muscles increased. Intensification of consumption of free fatty acids after repeated application of the same conditions, leading to maximum stability of the organism to intense hypoxia, was decidedly more noticeable than during the first application. Changes in glucose content were directly opposite changes in free-fatty-acid levels. It is proposed that one means of free-fatty-acid metabolism under the conditions investigated is their transformation into succinic acid. P.T.H.

A75-14852 # Hypodynamia and hypokinesia state of skeletal muscles (Gipodinamicheskoe i gipokineticheskoe sostoiianiia skeletnykh myshts). G. S. Katinas, V. S. Oganov, and A. N. Potapov (I Gosudarstvennyi Meditsinskii Institut, Leningrad; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Oct. 1974, p. 1606-1608. 15 refs. In Russian.

A75-14877 # Influence of acute hypoxia on the structure of the instrumental functions of the pilot (Vplyv ostrego nedotleneniia na strukture czynnoscii instrumentalnykh pilota). R. Bloszczyński (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). (*Polskie Towarzystwo Astronautyczne, Konferencja Naukowa Poswiecona Wspolczesnym Zagadnieniom Astronautyki, Augustow, Poland, Sept. 27-29, 1973.*) *Postepy Astronautyki*, vol. 7, no. 2-3, 1974, p. 9-19. 7 refs. In Polish.

Experimental studies are discussed, showing that acute hypoxia causes pronounced changes in the structure of the pilot's instru-

mental functions, and that the magnitude of the changes is a function of the exposure time. An experimental method is described, using which the magnitude and range of changes in the structure of the pilot's instrumental functions under conditions of acute hypoxia can be objectively recorded. V.P.

A75-14878 # Degree of reaction and decision taking of the pilot in stress situations (Poziom reaktywnosci a podejmowanie decyzji w sytuacji stresowej pilotow). J. Maciejczyk and J. Terelak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). (*Polskie Towarzystwo Astronautyczne, Konferencja Naukowa Poswiecona Wspolczesnym Zagadnieniom Astronautyki, Augustow, Poland, Sept. 27-29, 1973.*) *Postepy Astronautyki*, vol. 7, no. 2-3, 1974, p. 21-31. 19 refs. In Polish.

Pilots characterized by slow (high alpha-index) and fast (low alpha-index) reaction to stress situations caused by unexpected disturbances and danger were subjected to comparative tests. Pilots with a high alpha-index were found to be superior in performing tasks under the test conditions. V.P.

A75-14879 # Experimental investigation of pilot perception/decision processes under conditions of stress induced by lack of time (Badania eksperymentalne procesow percepcyjno-decyzyjnych pilotow w warunkach deficytu czasowego). P. Pokinko (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). (*Polskie Towarzystwo Astronautyczne, Konferencja Naukowa Poswiecona Wspolczesnym Zagadnieniom Astronautyki, Augustow, Poland, Sept. 27-29, 1973.*) *Postepy Astronautyki*, vol. 7, no. 2-3, 1974, p. 33-47. 22 refs. In Polish.

Empirical and semiempirical methods are described which proved to be effective in testing and predicting the air fitness of pilot applicants. Data obtained by these methods indicate that decision taking and perception is an intrinsic characteristic that is independent of experience and to some degree of age. In general, however, a trend of declining fitness with increasing age is to be observed. V.P.

A75-14880 # Range of brain temperature changes in hyperthermia as a function of animal size (Zakres zmian temperatury mozgu w obciazeniu termicznym, w zalezności od wielkości zwierzęcia). E. Tegowska, J. Narebski, W. Kadziela, and M. Caputa (Torun, Uniwersytet, Torun, Poland). (*Polskie Towarzystwo Astronautyczne, Konferencja Naukowa Poswiecona Wspolczesnym Zagadnieniom Astronautyki, Augustow, Poland, Sept. 27-29, 1973.*) *Postepy Astronautyki*, vol. 7, no. 2-3, 1974, p. 49-57. 6 refs. In Polish.

The mechanism of resistance to hyperthermia was studied, using wild rabbits weighing 3 kg and siberian hamsters weighing 0.1 kg. The differences in the reaction of these species to hot and dry environments are outlined. Data are presented which show that the thermal comfort of the brain of the small test animals has an appreciably greater range than that of the larger animals. V.P.

A75-14881 # The alpha-index as a criterion of pilot reaction (Indeks alfa jako kryterium reaktywnosci pilotow). J. Terelak and J. Maciejczyk (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). (*Polskie Towarzystwo Astronautyczne, Konferencja Naukowa Poswiecona Wspolczesnym Zagadnieniom Astronautyki, Augustow, Poland, Sept. 27-29, 1973.*) *Postepy Astronautyki*, vol. 7, no. 2-3, 1974, p. 59-68. 19 refs. In Polish.

It is shown experimentally that in an individual test subject both the EEG and the alpha-index are highly stable. The stability of the alpha-index constitutes an effective basis for psychological studies associated with the relationship between the alpha-index and the reaction of pilots to stress situations. V.P.

A75-14882 # Combined influence of accelerations and elevated temperature on the carbohydrate metabolism of the guinea pig

brain (Skojarzone dzialanie przyspieszen i podwyzszonej temperatury na przemiane wglowodanowa mozgu swinki morskiej). M. Wojtkowiak and J. Domaszuk (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). (*Polskie Towarzystwo Astronautyczne, Konferencja Naukowa Poswiecona Wspolczesnym Zagadnieniom Astronautyki, Augustow, Poland, Sept. 27-29, 1973.*) *Postepy Astronautyki*, vol. 7, no. 2-3, 1974, p. 69-75. In Polish.

A75-15044 **Apparatus for studying the human eye-movement system.** S. I. Kruglov. (*Optiko-Mekhanicheskaja Promyshlennost'*, vol. 41, Feb. 1974.) *Soviet Journal of Optical Technology*, vol. 41, Feb. 1974, p. 90, 91. 7 refs. Translation.

An apparatus, based on the photoelectric principle, for the study of the human eye movement is described. Details on the components (light source, mirrors, photocathode) and on the testing procedures (binocular tracking of a horizontally moving object with the head kept motionless) are given. N.D.

A75-15094 **Separation of effects of cardiovascular disease and age on ventricular function with maximal exercise.** R. A. Bruce, L. D. Fisher, M. N. Cooper, and G. O. Gey (Washington, University; Boeing Co., Seattle, Wash.). *American Journal of Cardiology*, vol. 34, Dec. 1974, p. 757-763. 15 refs. Contract No. NIH-71-2474.

To distinguish between the responses to maximal exercise caused by cardiovascular disease and those caused by aging, the percent deviation of observed values of maximal pressure-rate products and maximal heart rates from age-predicted values in healthy subjects were derived for 2,094 healthy middle-aged men and eight subgroups of 2,291 ambulatory male patients. Highly significant differences in left ventricular impairment and heart rate impairment were obtained. When left ventricular impairment is subtracted from functional aerobic impairment derived by nomogram from duration of multistage exercise using the Bruce protocol, the residual difference represents the peripheral circulatory impairment. Peripheral circulatory impairment was significantly increased in hypertensive patients and in patients with the combination of cardiac disease, angina pectoris and increased blood pressure. The significance of these findings is that impairment of circulatory delivery of oxygen can now be partitioned into left ventricular and peripheral components. (Author)

A75-15095 **Epidemiologic study of asymptomatic men screened by maximal treadmill testing for latent coronary artery disease.** V. F. Froelicher, Jr., M. M. Thomas, C. Pillow, and M. C. Lancaster (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *American Journal of Cardiology*, vol. 34, Dec. 1974, p. 770-776. 22 refs.

A group of 1,390 asymptomatic men screened for latent coronary artery disease by maximal treadmill testing and double Master two-step test were followed up for a mean of 6.3 years. Angina, sudden death or acute myocardial infarction was used as the end point for coronary heart disease. There were differences in testing sensitivity and specificity among age and subject groups, but maximal treadmill testing outperformed the double Master test as a screening technique. Maximal treadmill testing demonstrated a 60.9% sensitivity, 92% specificity and a 20% probability that coronary artery disease would develop in a subject with an abnormal response. A risk ratio of 14.3 was obtained and demonstrated that maximal treadmill testing was a valuable screening technique for latent coronary artery disease. However, limitations of the sensitivity and specificity of the functional S-T segment response were apparent. (Author)

A75-15185 # **Experiment in post-hypnotic realization of a subjective experience of partial weightlessness during simulation of a**

three-day space flight program (Opyt postgipnoticheskoi realizatsii sub'ektivnogo perezhivaniia chastichnoi vesomosti pri modelirovanii programmy trekhсутochnogo kosmicheskogo poleta). L. P. Grimak and L. S. Khachaturskii. *Zhurnal Vyshej Nervnoi Deiatel'nosti*, vol. 24, Sept.-Oct. 1974, p. 899-906. 16 refs. In Russian.

A75-15186 # **Dynamics of heart rhythm as an indicator of a conditioned reaction to time in man (Dinamika serdechnogo ritma kak pokazatel' uslovnoi reaktsii na vremia u cheloveka).** V. M. Vasil'eva and E. K. Stoeva-Arons (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Vyshej Nervnoi Deiatel'nosti*, vol. 24, Sept.-Oct. 1974, p. 907-916. 20 refs. In Russian.

The relationship between heart rhythm and conditioned reactions to time was studied in human subjects. During rhythmic application of a stimulus which was to be followed by a definite motor reaction, there developed between stimuli an anticipation reaction (conditioned reflex to time) in the form of a slowing down of heart rhythm. This reaction is discussed as resulting from the interaction of several factors. P.T.H.

A75-15187 # **Development of temporary connections in man with the aid of unrecognized visual stimuli (Vyrabotka vremennykh svyazei u cheloveka s pomoshch'iu neosoznavaemykh zritel'nykh razdrashitelei).** Iu. L. Arzumanov (Tsentral'nyi Nauchno-Issledovatel'skii Institut Sudebnoi Psikhiiatrii, Moscow, USSR). *Zhurnal Vyshej Nervnoi Deiatel'nosti*, vol. 24, Sept.-Oct. 1974, p. 917-923. 22 refs. In Russian.

Averaged evoked potentials (AEP) were recorded in the visual area of the right and left cerebral hemispheres in response to two different stimuli, an arrow and a word, presented successively at a one-second interval. The AEP to the first stimulus, when joined with an emotional word, had a shorter latency and greater amplitude of the P 300 component than that to a stimulus preceding a neutral word. It was possible to form temporary connections with an unrecognized stimulus cue (degree of inclination of the arrow). P.T.H.

A75-15188 # **Adaptive control of alpha rhythm in man under controlled experimental conditions (Adaptivnaia reguliatsiia al'fa-ritma cheloveka v usloviakh upravliaemogo eksperimenta).** A. S. Tsukerman and E. A. Kernes (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Zhurnal Vyshej Nervnoi Deiatel'nosti*, vol. 24, Sept.-Oct. 1974, p. 1002-1010. 27 refs. In Russian.

Results of an experiment are presented in which human subjects were able to learn visual control of the alpha rhythm of the somatosensory regions of the brain. Twelve out of sixteen subjects were able to lower the intensity of the alpha rhythm without previous training, while ten out of twelve could increase it. The universality of this ability in man is discussed along with its possible uses in biocontrol and medicine. P.T.H.

A75-15189 # **Somatosensory evoked potentials in man by self-stimulation (Somatosensornye vyzvannye potentsialy cheloveka pri samostimulatsii).** A. M. Ivanitskii and V. B. Strelets (Tsentral'nyi Nauchno-Issledovatel'skii Institut Sudebnoi Psikhiiatrii, Moscow, USSR). *Zhurnal Vyshej Nervnoi Deiatel'nosti*, vol. 24, Sept.-Oct. 1974, p. 1048-1051. 5 refs. In Russian.

Comparative studies of the somatosensory evoked potentials in the brain with experimenter and subject himself giving the stimulus were carried out in order to test a hypothesis on the difference in informational content in the early and late waves of an evoked potential. According to this hypothesis, the early response waves reflect the arrival in the brain of information concerning the physical characteristics of the stimulus, while the later ones reflect the arrival of information on its signal significance. P.T.H.

A75-15190 # Amplitude of the T-component of an ECG as a correlate of emotional stress (Amplituda T-zubtsa EKG kak korreliat emotsional'nogo napriazheniia). M. V. Frolov and E. P. Sviridov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 24, Sept.-Oct. 1974, p. 1052-1055. 7 refs. In Russian.

Experimental data are presented which show the feasibility of using the amplitude of the T-component of an ECG as an indicator of human emotional stress. This amplitude has, in comparison with the frequency of heart contraction, several advantages: higher sensitivity, less inertia, and more significant dynamic range of variation. P.T.H.

A75-15311 Origin proposed for non-protein amino acids in meteorites. D. F. Evered (Chelsea College, London, England). *Nature*, vol. 252, Nov. 29, 1974, p. 388. 16 refs.

The presence of the nonprotein amino acids, D- and L-beta-aminoisobutyric acid and beta-alanine is described as evidence for the indigenous origin of meteorite amino acids. It is implied that these beta-amino acids arise by prebiotic condensation of ammonia, methane, hydrogen, water, and other simple primordial molecules. The results of experimental studies of the problem are briefly considered. It is suggested that heterocyclic compounds could also act as precursors for the beta-amino acids found in meteorites. G.R.

A75-15330 Preliminary weight evaluations of a biological system for oxygen and water regeneration. I. A. Terskov, I. I. Gitelson, V. A. Darg, and B. G. Kovrov (Akademiia Nauk SSSR, Moscow, USSR). *Astronautica Acta*, vol. 18, Supplement 2, Apr. 1974, p. 145-148. 7 refs.

A life-support system with biological regeneration of oxygen and water is considered. An optimal strategy for planning the system structure depending on the flight duration and number of crew personnel is obtained on the basis of mathematical calculations.

(Author)

A75-15405 Methodological factors influencing loudness of short duration sounds. S. D. G. Stephens (Medical Research Council, Cambridge; Aeronautical Research Council, National Physical Laboratory, Teddington, Middx., England). *Journal of Sound and Vibration*, vol. 37, Nov. 22, 1974, p. 235-246. 22 refs.

Three experiments were performed showing the relevance of methodological considerations to the apparent loudness of short duration equal-energy tone-bursts. In the first, the effect of slight modifications of the instructions on the results was shown. In the second the different results obtained with two techniques of loudness evaluation were studied. In the final experiment the difference in the loudness configuration of equal-energy tone-bursts evaluated by loudness estimation and loudness balance techniques was emphasized. With both techniques, however, a frequency-dependent critical duration was found. (Author)

A75-15445 Standards to which electronic medical equipment should respond (Normes auxquelles doit répondre le matériel d'électronique médicale). R. J. Plaszczynski. *L'Onde Electrique*, vol. 54, Oct. 1974, p. 423-428. In French.

A wide proliferation of electrical equipment into the field of medicine can be observed today and numerous electronic devices have not only a direct conductive connection with the patient's body, but often through catheters penetrate the heart itself. In this situation leakage current can cause serious accidents of cardiac

fibrillation even at levels lower than 0.1 mA. New safety standards are required. Here, a synthesis of the standardization work in France, in the field of medical electrical and electronic equipment, is presented. An example of the protection of a patient by using 'floating circuits' is given and emphasis is placed on the cooperation between doctors and engineers. F.R.L.

A75-15522 Changes of peripheral venous tone and central transmural venous pressure during immersion in a thermo-neutral bath. M. Echt, L. Lange, and O. H. Gauer (Berlin, Freie Universität, Berlin, West Germany). *Pflügers Archiv*, vol. 352, no. 3, 1974, p. 211-217. 22 refs. Contract No. F44620-71-C-0117.

Peripheral venous tone, central venous and oesophageal pressures were recorded while the upright sitting subjects were immersed to the neck in a thermoneutral water bath. The central venous pressure rose from 3.4 to 15.2 mm Hg and the oesophageal pressure from -0.4 to +3.4 mm Hg. The transmural pressure, which determines the enddiastolic volume of the heart, increased by 8.0 mm Hg. Plethysmographic determinations of peripheral venous tone revealed a relaxation of the peripheral veins: after a quick initial decrease of the volume elasticity coefficient (E₁₅) from 16.6 to 13.5 mm Hg/ml/100 g tissue there is a continuous decline to 11.8 mm Hg/ml/100 g tissue after 3 hrs immersion. This relaxation persists for at least 1 hr after termination of immersion. (Author)

A75-15523 Heart volume in relation to body posture and immersion in a thermo-neutral bath - A roentgenometric study. L. Lange, S. Lange, M. Echt, and O. H. Gauer (Klinikum Westend, Berlin, West Germany). *Pflügers Archiv*, vol. 352, no. 3, 1974, p. 219-226. 18 refs. Contract No. F44620-71-C-0117-P00003.

Ten subjects, aged 24-32, were studied in a roentgenometric determination of heart volume during changes of posture and water immersion. Heart volume was determined under three conditions: standing in air, standing in water and supine. Heart size in the supine posture, which is taken as standard, was 739.4 ± or - 38.1 ml. This increased to 839.1 ± or - 65.2 ml during immersion, and decreased to 658.8 ± or - 46.7 ml in the subject standing in air. The increase in heart-volume when immersing a standing subject in a water bath amounted to 120 to 329 ml (mean 180 ml ± or - 61.8 ml). The radius of curvature of the right atrium decreased considerably during the transition from standing in air to standing in water. This is taken as an indication of preferential atrial, as opposed to ventricular, filling which should be expected from the different thickness of the atrial and ventricular walls. (Author)

A75-15524 The influence of self-controlled changes in ambient temperature on autonomous circadian rhythms in man. R. Wever (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen und Erling-Andechs, West Germany). *Pflügers Archiv*, vol. 352, no. 3, 1974, p. 257-266. 25 refs.

In human experiments under constant conditions where circadian rhythms run autonomously, eight subjects were exposed to a self-controlled cycle of ambient temperature: room temperature had been set 6°C higher during activity time (wakefulness) than during rest time (sleep) by the subjects. Under these conditions, the autonomous circadian period was significantly longer than under conditions of constant room temperature of the same mean value. In addition, the change in the period caused by the transition between the two temperature modes was positively correlated to the original period. These results are in agreement with results obtained under the influence of a self-controlled light-dark cycle. (Author)

A75-15525 # Systolic time intervals at rest and during exercise. D. Cardus (Baylor University, Houston, Tex.) and L. Vera. *Cardiology*, vol. 59, no. 3, 1974, p. 133-153. 61 refs.

Measurements of the electromechanical systole (QS2) and its components - electromechanical delay (QS1), isovolumic contraction time (ICT), and left ventricular ejection time (LVET) - were conducted on 30 healthy men at rest and during exercise of varying intensity. The measurements were performed through simultaneous, noninvasive recordings of the electrocardiogram, phonocardiogram, and carotidogram. QS2 and its components are principally correlated to the duration of the cardiac cycle; in changing posture from supine to sitting, the mean QS1 and mean ICT tend to increase, but these changes are not statistically significant. LVET and QS2 are both significantly shortened. During exercise there is a decrease in the mean values of QS1, ICT, LVET, and QS2. (Author)

A75-15615 # An algorithm for the detection of signals on the basis of the color contrast on the screen of a color cathode ray tube /a color indicator/ (Algoritm obnaruzheniia signalov po tsvetovomu kontrastu na ekrane tsvetnoi elektronoluchevoi trubki /tsvetnogo indikatora/). S. I. Pozdniak, P. A. Pozin, and A. K. Senatorov. *Radioelektronika*, vol. 17, Oct. 1974, p. 36-40. In Russian.

Formulation of a decision rule for detecting target blips on the basis of a color contrast with allowance for the threshold sensitivity of the operator's eye. The desired signal detection algorithm is constructed on the basis of MacAdam's equicontrast diagram, which is based on a determination of the mean errors of color matches mapped onto the 1931 International Illumination Commission graph in the form of ellipses of various sizes and directions. It is shown that with the aid of this diagram it is possible to determine the statistical characteristics of the color contrast and from then, with the aid of a certain rule, to determine the signal detection characteristics. This theory is illustrated in the cases of two- and three-color indicators.

A.B.K.

A75-15727 Autostimulation of the central nervous system (L'autostimulation du système nerveux central). H. Guilleux (Roussel-Uclaf, Paris, France). *La Recherche*, vol. 5, Nov. 1974, p. 948-954. 8 refs. In French.

Experimental study of autostimulation in rats, based on the electrical stimulation of the brain. The theory of a pleasure center or centers is disputed in the light of the latest research and the pleasure motion is found to be too simplistic. Details of the experiment, with the implantation of electrodes in the hypothalamus of the rat and the response of the animal are discussed. If the autostimulation is strong enough it can take precedence over feeding and sexual activity up to and including death. The role of the production of noradrenaline and dopamine in the autostimulation phenomenon is analyzed.

N.D.

A75-15731 Velocity perception (La perception de la vitesse). M. Bolzoni. *La Recherche*, vol. 5, Nov. 1974, p. 990-992. 6 refs. In French.

Study of kinesthesia, considering that visual perception has at least the role of bringing a complement of information, permitting the organism to continue to observe velocity in the absence of labyrinthine or articular stimulators. From this role of application, the visual perception of velocity has been promoted to the principal role by researches undertaken by NASA on the vestibular physiology, within the framework of pilotage of aircraft and space vehicles. Peripheral vision is the principal detector of velocity. The interactions between visual perception and labyrinthine perception have been confirmed on the neurophysiological plane. Details on the role of the foveal and peripheral retina are given, with still further research to be done on habit susceptibility.

F.R.L.

A75-15776 Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta,

Canada, May 28-31, 1973. Symposium sponsored by the Medical Research Council of Canada, et al. Edited by K. Lederis and K. E. Cooper (Calgary, University, Calgary, Alberta, Canada). Basel, S. Karger AG, 1974. 445 p. \$49.25.

Numerous papers are gathered together presenting new experimental data on the hypothalamus and hormones, metabolic and behavioral aspects of the hypothalamic function, and the hypothalamus in thermoregulation. Some of the topics covered include: temporal organization of neuroendocrine function in relation to the sleep-waking cycle in man, the influence of hyperthyroidism on the hypothalamo-hypophyseal-thyroid axis, the control of prolactin secretion, brain catecholamines in the regulation of ACTH secretion, range of control of cardiovascular variables by the hypothalamus, and evidence for the involvement of prostaglandins in fever.

P.T.H.

A75-15777 Temporal organization of neuroendocrine function in relation to the sleep-waking cycle in man. E. D. Weitzman (Montefiore Hospital and Medical Center; Albert Einstein College of Medicine, Bronx, N.Y.). In: Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta, Canada, May 28-31, 1973. Basel, S. Karger AG, 1974, p. 26-38. 25 refs.

A75-15778 * Range of control of cardiovascular variables by the hypothalamus. O. A. Smith, R. B. Stephenson, and D. C. Randall (Washington, University, Seattle, Wash.). In: Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta, Canada, May 28-31, 1973. Basel, S. Karger AG, 1974, p. 294-305. 9 refs. Grants No. NGR-48-022-131; No. NIH-RR-00166; No. PHS-HL-04741; No. PHS-GM-00260.

New methodologies were utilized to study the influence of the hypothalamus on the cardiovascular system. The regulation of myocardial activity was investigated in monkeys with hypothalamic lesions that eliminate cardiovascular responses. Observations showed that a specific part of the hypothalamus regulates changes in myocardial contractility that accompanies emotion. Studies of the hypothalamus control of renal blood flow showed the powerful potential control of this organ over renal circulation.

T.S.

A75-15779 The role of the hypothalamus in the organization of patterns of cardiovascular response. S. M. Hilton (Medical School, Birmingham, England). In: Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta, Canada, May 28-31, 1973. Basel, S. Karger AG, 1974, p. 306-314. 37 refs.

The paper examines the division of the brain stem into a hypothalamus, mid-brain, pons, and medulla in terms of physiological functions. Specific areas exist in every part of the brain stem which act together as a functional unit which integrates the response to baroreceptor afferent stimulation. A longitudinal form of organization for cardiovascular control from the hypothalamus through the mid-brain and to the medulla which function so as to produce patterns of response is suggested.

T.S.

A75-15780 Neuronal models of hypothalamic temperature regulation. J. Bligh (Agricultural Research Council, Institute of Animal Physiology, Babraham, Cambs., England). In: Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta, Canada, May 28-31, 1973. Basel, S. Karger AG, 1974, p. 315-327. 24 refs.

A mechanism of central nervous regulation of body temperature is evaluated in a study of the relations between afferent signals from temperature sensors and the efferent signals to thermoregulatory effectors in neuronal terms. Neuronal models based on (1) thermal disturbance-thermoregulatory response relations, (2) hypothalamic unit activity studies, and (3) pharmacological interference with hypothalamic synaptic functions are discussed. The neuronal model presented describes occurrences when natural synaptic events in neuronal pools concerned with temperature regulation are disturbed.

T.S.

A75-15781 Hypothalamic control of thermoregulatory behavior. E. R. Adair (Yale University, New Haven, Conn.). In: Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta, Canada, May 28-31, 1973.

Basel, S. Karger AG, 1974, p. 341-358. 28 refs. Grant No. PHS-ES-00354.

The interaction between the preoptic and posterior hypothalamic thermosensitive areas in the behavioral control of body temperature is examined. Results show that thermal stimulation of posterior hypothalamus can alter thermoregulatory behavior effectively as can comparable thermal stimulation of the preoptic area. Behaviorally produced body temperature changes in the steady state show additivity of action when the temperature of preoptic and posterior hypothalamic areas are simultaneously displaced. The results of these studies and implications for the model of temperature regulation are evaluated.

T.S.

A75-15782 Ionic concepts of the set-point for body temperature. R. D. Myers (Purdue University, Lafayette, Ind.). In: Recent studies of hypothalamic function; Proceedings of the International Symposium, Calgary, Alberta, Canada, May 28-31, 1973.

Basel, S. Karger AG, 1974, p. 371-390. 21 refs.

The paper examines the involvement of the posterior hypothalamus in diametrically opposed responses in Na(+) and Ca(++) ions. The findings may represent a series of nonspecific effects within the nervous system or they may be based on neural artifacts. A steady-state constancy is seen in the ratio between Na(+) and Ca(++) ions which stabilizes the set-point for an individual's lifetime. A schematic diagram illustrates the relationships between the factors that stimulate the anterior hypothalamic, preoptic region and the aminergic pathways where signals for heat production are conveyed along a cholinergic link.

T.S.

A75-15818 Some experience with flight-related electrocutaneous and vibrotactile displays. T. J. Triggs, W. H. Levison (Bolt Beranek and Newman, Inc., Cambridge, Mass.), and R. Sanneman (Sanders Associates, Inc., Nashua, N.H.). In: Cutaneous communication systems and devices; Proceedings of the Conference, Monterey, Calif., April 17, 18, 1973. Conference sponsored by the Advanced Research Projects Agency and U.S. Navy. Austin, Tex., Psychonomic Society, Inc., 1974, p. 57-64. 30 refs. Contract No. N00014-73-C-0031.

The display requirements in modern aircraft are considered along with studies related to auditory flight displays and tactual vehicle control displays. Tactual tracking studies are discussed, giving attention to a comparison of tactual and visual tracking, tactile display location, type of stimulation, and the program of research. Questions regarding the initial selection of display parameters are investigated and aspects of initial display evaluation are explored.

G.R.

A75-15819 Rate control in man-machine systems. J. Hirsch (U.S. Navy, Naval Undersea Research and Development

Center, Pasadena, Calif.). In: Cutaneous communication systems and devices; Proceedings of the Conference, Monterey, Calif., April 17, 18, 1973. Conference sponsored by the Advanced Research Projects Agency and U.S. Navy. Austin, Tex., Psychonomic Society, Inc., 1974, p. 65-72. 15 refs.

Improvements in man-machine control-system performance have been achieved in some cases through 'unburdening' and 'quickening'. In 'unburdening' the operator is relieved of the task of acting as an integrator. 'Quickening' provides the operator with immediate knowledge of the effects of his own responses. It is proposed that tactile signals be employed to present rate information as an alternative to quickening a visual display. The new concept presented is useful for the control of unmanned moving objects such as target drones, space orbiters, crop sprayers, and remote-controlled undersea vehicles. It is also applicable to collision-anticipation systems for aircraft.

G.R.

A75-15999 # Transient and steady state effects of CO2 on mechanisms determining rate and depth of breathing. G. W. Bradley, C. von Euler, I. Marttila, and B. Roos (Kungl. Karolinska Institutet; Kungl. Tekniska Hogskolan, Stockholm, Sweden). *Acta Physiologica Scandinavica*, vol. 92, Nov. 1974, p. 341-350. 23 refs. Research supported by the Swedish Medical Research Council and Kungl. Karolinska Institutet. SMRC Project 14X-544.

A75-16000 # Steady state effects of CO2 and temperature on the relationship between lung volume and inspiratory duration/Hering-Breuer threshold curve. G. W. Bradley, C. von Euler, I. Marttila, and B. Roos (Kungl. Karolinska Institutet; Kungl. Tekniska Hogskolan, Stockholm, Sweden). *Acta Physiologica Scandinavica*, vol. 92, Nov. 1974, p. 351-363. 17 refs. Research supported by the Swedish Medical Research Council and Kungl. Karolinska Institutet. SMRC Project 14X-544.

A75-16021 Minor elements and evolution. F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Machida, Tokyo, Japan). *Journal of Molecular Evolution*, vol. 4, Nov. 29, 1974, p. 113-120. 20 refs.

Minor elements such as molybdenum and iron are essential elements or 'bioelements' for microorganisms, plants, and higher animals. However, chromium is not regarded as a bioelement in the same sense. This may be explained by their relative concentrations in sea water. Molybdenum is the most abundant of the transition elements in sea water. Its participation in different oxido-reductases such as nitrogenase, nitrate reductase, and CO2 reductase of primitive bacteria could be related to its abundance. Good correlation can be found between the biological behavior of different elements and their concentration in sea water. This suggests the hypothesis that the composition of the present sea water reflects that of the primeval sea water at the time of the evolution of these enzyme systems.

(Author)

A75-16022 * Hot hydrogen atoms reactions of interest in molecular evolution and interstellar chemistry. R. S. Becker, K. Hong, and J. H. Hong (Houston, University, Houston, Tex.). *Journal of Molecular Evolution*, vol. 4, Nov. 29, 1974, p. 157-172. 20 refs. Grant No. NGR-44-005-091.

Hot hydrogen atoms which are photochemically generated initiate reactions among mixtures of methane, ethane, water and ammonia, to produce ethanol, organic amines, organic acids, and amino acids. Both ethanol and ethyl amine can also act as substrates for formation of amino acids. The one carbon substrate methane is sufficient as a carbon source to produce amino acids. Typical quantum yields for formation of amino acids are approximately

0.00002 to 0.00004. In one experiment, 6 protein amino acids were identified and 8 nonprotein amino acids verified utilizing gas chromatography-mass spectroscopy. We propose that hot atoms, especially hydrogen, initiate reactions in the thermodynamic non-equilibrium environment of interstellar space as well as in the atmospheres of planets. (Author)

A75-16173 # Instantaneous measurement of the pulmonary blood flow by a glow discharge gas analyser. T. Koyama. *Hokkaido University, Research Institute of Applied Electricity, Bulletin*, vol. 25, Dec. 1973, p. 85-98. 22 refs.

Combining a glow discharge gas analyser with prolonged constant flow expiration, a method was introduced for a sequential measurement of the pulmonary blood flow Q . By this method, the time course of Q could be calculated every 2.5 seconds from the continuously detected acetylene fraction in expired gas. The average of successively determined Q values at rest, showing a standard deviation of 8% in each individual serial measurement, agreed with the value obtained by a breath holding method within 4.4% error.

(Author)

A75-16200 # Dynamics of pulmonary gas exchange and heart rate changes at start and end of exercise. D. Linnarsson (Kungl. Karolinska Institutet, Stockholm, Sweden). *Acta Physiologica Scandinavica, Supplementum* no. 415, 1974, 66 p. 103 refs. Research supported by the Swedish Medical Research Council. SMRC Project 40X-680; SMRC Project 40X-682.

An investigation to further analyze the time courses of respiratory gas exchange during the unsteady states of muscular exercise, using a systems analysis approach to quantify the time patterns during various conditions. Specifically the objectives may be summarized as follows: to further develop methods for the continuous breath-by-breath measurement of O_2 uptake and pulmonary-capillary O_2 transfer during unsteady states of exercise, studying the time courses of these variables together with those of ventilation and heart rate by using computers; to identify and quantify the various time components of the pulmonary gas exchange and heart-rate responses during step changes in ergometric work load; to relate changes in the dynamic behavior of the measured variables to the work level in such a way that influences of the absolute work intensity could be distinguished from those of the relative work intensity; and finally to relate the various time components of the VO_2 response to submaximal exercise to simultaneously measured ventilatory and heart-rate responses. F.R.L.

A75-16249 # Comparative morphology of the internal carotid artery of some mammals (Porivnial'na morfologiya vnutrish-n'oi sonnoi arterii deiakikh ssavtsiv). V. Kh. Khamatov (Melitopol's'kii Pedagogichnii Institut, Melitopol, Ukrainain SSR). *Akademiia Nauk Ukrain's'koi RSR, Dopovidi, Seriya B - Geologiya, Geofizika, Khimiia i Biologiya*, vol. 36, Oct. 1974, p. 946-949. 10 refs. In Ukrainian.

The arteries in the head and brain of 90 mammals belonging to 52 species are studied. It is shown that the internal carotid artery runs to the frontal portion of the arterial brain circulation system and that the rete mirabile is formed by internal carotid artery in all of the mammals studied. V.P.

A75-16271 Thermoregulation and bioenergetics: Patterns for vertebrate survival. H. Swan (Colorado, University, Denver; Colorado State University, Fort Collins, Colo.). New York, American Elsevier Publishing Co., Inc., 1974. 442 p. 796 refs. \$19.

Aspects of life in the universe are examined, giving attention to bioenergetics, body temperature, and patterns for survival. Questions regarding the minimal viable metabolic rate are discussed along with the measurement of metabolic rate, torpidation, body temperature regulation, the concept of homologous similitude, the resting active metabolic rate, and the study of death from cold. Other topics considered include membranes, poikilothermia, hypothermia, hibernation, aestivation and the aestivating poikilotherm, the control of metabolism, the shapes of vertebrates, and the metabolic rate of homeotherms. G.R.

A75-16342 # Anisotropic, nonlinear-elastic model of the large blood vessels in man (Anizotropnaia nelineino-uprugiaia model' krupnykh krovenosnykh sosudov cheloveka). V. A. Kas'ianov (Akademiia Nauk Latvinskoi SSR, Institut Mekhaniki Polimerov, Riga, Latvian SSR). *Mekhanika Polimerov*, Sept.-Oct. 1974, p. 874-884. 84 refs. In Russian.

A mathematical model, based on the theory of large deformations, is proposed, which describes some of the processes in the deformation of the large human blood vessels. The specific deformation energy function for a vessel is chosen in the form of a sum of exponent terms. Material constants in this function were determined from experiments in uniaxial tension performed along the two principal axes of anisotropy of samples of human abdominal aortal material. P.T.H.

A75-16472 Effects of high-altitude exposure on sub-maximal endurance capacity of men. J. T. Maher, L. G. Jones, and L. H. Hartley (U.S. Army, Research Institute of Environmental Medicine, Natick; Boston City Hospital, Boston, Mass.). *Journal of Applied Physiology*, vol. 37, Dec. 1974, p. 895-898. 33 refs.

Previous studies have shown that the acute reduction in maximal O_2 uptake at high altitude is sustained during chronic exposure. The present study examines the associated changes in the capacity for prolonged (longer than 1 hr), submaximal exercise with continued stay at altitude. Experiments were carried out in eight well-conditioned young men at sea level and after 2 and 12 days at 4,300 m. The data suggest that the improved capacity for submaximal endurance exercise with sojourn at high altitude is, at least in part, a reflection of increased oxygen availability to the working muscle.

(Author)

A75-16473 Effect of age on hemodynamic and metabolic response to static exercise. D. J. McDermott, W. J. Stekiel, J. J. Barboriak, L. C. Kloth, and J. J. Smith (Wisconsin, Medical College; U.S. Veterans Administration, Wood Veterans Administration Center, Milwaukee, Wis.). *Journal of Applied Physiology*, vol. 37, Dec. 1974, p. 923-926. 19 refs.

Static muscle exercise tests consisting of one-third maximum voluntary contraction of the forearm for 5 min was carried out in a group of older (mean age 46.8 yr) and younger men (mean age 25.3 yr). The mean hemodynamic changes in the two groups were quite comparable with increases in heart rate (31.3 and 38.4 beats/min), systolic pressure (74.3 and 63.2 mmHg), and diastolic pressure (58.1 and 47.3 mmHg) in older and younger groups, respectively. The results indicate that the adrenomedullary response induced by static exercise may be significantly influenced by age. (Author)

A75-16475 * A simplified control system for predicting hypophyseal, growth hormone response of human subjects to various physical activities. J. C. Howard and D. R. Young (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *Indian Journal of Nutrition and Dietetics*, vol. 11, 1974, p. 144-168. 24 refs.

A75-16504 * Short forms of the Texas Social Behavior Inventory /TSBI/, an objective measure of self-esteem. R. Helmreich and J. Stapp (Texas, University, Austin, Tex.). *Psychonomic Society, Bulletin*, vol. 4, no. 5A, Nov. 1974, p. 473-475. 10 refs. Grant No. NGR-44-012-224.

Two short (16 item) forms of the Helmreich, Stapp, and Ervin (1974) Texas Social Behavior Inventory, a validated, objective measure of self-esteem or social competence are presented. Normative data and other statistics are described for males and females. Correlations between each short form and long (32-item) scale were .97. Factor analysis and part-whole correlations verified the similarity of the two forms. The utility of the scale in research is described. (Author)

A75-16606 # The change of heart rate during mental work. M. Nakamura, M. Okaue, and H. Hori (Japan Air Self Defense Force, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 14, Mar. 1974, p. 181-190. 9 refs. In Japanese, with abstract in English.

Experiments were to evaluate the change of heart rate during mental work. Two cases of the heart rate were tested; one at the time of research presentation; the other of personal behavior under the anxiety states. The following results were obtained: the rapid increase in heart rate was observed when the meeting began, with the increment decreasing immediately after it was finished and it returned to normal. The individual differences could be divided into two types, one which keeps the same level, the other which fluctuates. The change will be caused by some emotional situations such as questions and excitements. When the method of systematic desensitization was given, the heart rate increment was observed along with the muscles tension. The heart rate is affected by the emotion easily, but by training, it is possible that the change of heart rate can be lightened gradually. It is possible that the anxiety can be suppressed by controlling one's own heart rate. F.R.L.

A75-16607 # The effects of short term fasting on mental performance. K. Kataoka, H. Hagihara, T. Ako, and I. Kuroda (Japan Air Self Defense Force, Tokyo, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 14, Mar. 1974, p. 199-205. 7 refs. In Japanese, with abstract in English.

The effects of fasting on mental performance were evaluated on eight normal, healthy adults during a seventeen-hours period of complete fasting. Flicker value, an addition test, a color naming test, and a tracking task were used to measure mental performance. Tracking performance showed no significant difference between control and fasting. Flicker value and the addition test showed a slight decrease in fasting. The color naming test showed a fair decrease in fasting. Plasma glucose and blood lactate were maintained to normal level. (Author)

A75-16609 # Role of metabolic shifts in pathogenesis of vestibular disturbances (Rol' obmennyykh sdvigov v patogeneze vestibuliarnykh narushenii). Iu. F. Udalov and E. V. Lapaev. *Voenna-Meditsinskii Zhurnal*, Oct. 1974, p. 64-66. In Russian.

Experiments were conducted to study the effect of the metabolic shifts characteristic of flight activities on the dynamics of vestibular sensitivity and the organism's stability under the effects of acceleration. The data implied that changes in protein and pyridoxine metabolism have a significant role as extralabyrinthine factors in the pathogenesis of vestibular disturbances. It was found that when vestibular stability is decreased, metabolic changes are more clearly expressed. The importance of balanced preflight nutrition is emphasized. Pilots should systematically take multi-vitamin preparations including pyridoxine to prevent vestibular (especially sensory) disturbances. A.T.S.

STAR ENTRIES

N75-12499 Joint Publications Research Service, Arlington, Va.
EMPIRICAL MODEL OF THE ROOT SYSTEM OF WINTER WHEAT CONSIDERING WEATHER CONDITIONS AND THE SOIL MOISTURE DISTRIBUTION BY LAYERS

A. R. Konstantinov, L. V. Shcherbak, and L. G. Rudenko *In its Meteorology and Hydrol.*, No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 110-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 88-94

The depth of penetration of the root system of winter wheat into the soil was analyzed as a function of the climatic conditions, soil moisture and specific weight of the soil. The analysis was made by the remainder method using graphical regressions. The growth rate of the root system during different interphase periods and the vertical distribution of the root mass were estimated as a function of the mean moisture and its vertical distribution. As a result, a model of the root system was created which makes it possible to calculate its mass and the dept of penetration into the soil by interphase periods. Author

N75-12544*# State Univ. of New York, Buffalo. Dept. of Biology.

RADAR STUDIES OF BIRD MIGRATION Final Report, 1 Aug. 1970 - 31 Aug. 1974

Timothy C. Williams and James M. Williams 30 Nov. 1974 38 p refs
 (Grant NGR-33-183-003)

(NASA-CR-139802) Avail: NTIS HC \$3.75 CSCL 06C

Observations of bird migration with NASA radars were made at Wallops Island, Va. Simultaneous observations were made at a number of radar sites in the North Atlantic Ocean in an effort to discover what happened to those birds that were observed leaving the coast of North America headed toward Bermuda, the Caribbean and South America. Transatlantic migration, utilizing observations from a large number of radars is discussed. Detailed studies of bird movements at Wallops Island are presented. Author

N75-12545# Research Inst. of National Defence, Sundbyberg (Sweden).

A SYSTEM OF COMPUTER PROGRAMS FOR RECORDING THE ACTIVITY OF MICE [SMIL - ETT SYSTEM AV DATORPROGRAM FOER REGISTRERING AV MUSAKTIVITET]

Anders Hasselrot Oct. 1972 29 p refs In SWEDISH (FOA-1-C-1478-M4) Avail: NTIS HC \$3.75

Program and data organization are described recording mice activity in a wheel by the FOA computer PDP 8/1 time sharing system TIROS. The program consists of three units: The proper data collecting program and two associated supporting programs. The latter are concerned with specifying the trail parameters and for comparison of recorded data. The basis, in the form of exact data structure on magnetic tape, allows for the development of more advanced ways of calculating, particularly with a view to statistical treatment. Author

N75-12546*# Alabama Univ., Huntsville.

DETERMINATION OF POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS INTO LIMESTONE AQUIFERS USING THERMAL INFRARED IMAGERY Interim Report

F. L. Doyle 31 Oct. 1974 19 p refs

(Contract NAS8-30216)

(NASA-CR-120540) Avail: NTIS HC \$3.25 CSCL 06I

Lineations were identified involving the application of ERTS imagery to geologic and hydrologic problems. Interpretation of the southwest Madison County area is discussed. The tracing of the Beech Grove lineament to the northern boundary of Madison County, Alabama raises the question of its relationship to the trend of lineations in southwestern Madison County. The use of thermography as an indication of soil moisture is reviewed. The effect of soil moisture on surface temperature and the relationship between soil moisture and ground water are examined. J.A.M.

N75-12547# Clemson Univ., S.C.

MATHEMATICAL MODELING OF DONNAN DIALYSIS; A CONTINUOUS ION EXCHANGE MEMBRANE PROCESS Annual Progress Report

S. S. Melsheimer 31 May 1974 28 p refs

(Contract AT(38-1)-810)

(SRO-810-1) Avail: NTIS HC \$3.75

The mathematical model of Donnan dialysis was extended to include series mass transfer resistances located in the feed channel boundary layer and in the membrane. In order to separate the feed channel and membrane resistances, continuous flow stirred cell experiments were used to independently determine the membrane counterion mass transfer coefficient. The feed channel counterion mass transfer coefficient, along with the coion leakage coefficient and the solvent permeability constant, was determined from operating data on a parallel channel counterflow dialyzer. Insufficient data have been analyzed to permit correlation of these parameters or evaluation of the adequacy of the two resistance model. Preliminary results do indicate that the model is tractable, yielding reasonably consistent parameter values with moderate computation time. The model is programmed in Fortran. Author (NSA)

N75-12548# Brandeis Univ., Waltham, Mass.

MOLECULAR BASIS FOR THE MUTAGENIC AND LETHAL EFFECTS OF ULTRAVIOLET IRRADIATION Progress Report, 4 Oct. 1973 - 29 May 1974

L. Grossman 29 May 1974 11 p refs

(Contract AT(11-1)-3232)

(COO-3232-3) Avail: NTIS HC \$3.25

Progress is reported on the following research projects: isolation of endonucleases specific for UV-irradiated DNA from *Micrococcus luteus* and *Escherichia coli*; biological assay for in vitro repair of DNA; reinsertion of nucleotides into DNA strands; and biochemical repair of UV-irradiated *Bacillus subtilis* transforming DNA. NSA

N75-12549# Brandeis Univ., Waltham, Mass.

EFFECT OF LIGHT ON RESPIRATION AND DEVELOPMENT OF PHOTOSYNTHETIC CELLS Progress Report, 1 Sep. 1973 - 31 Aug. 1974

M. Gibbs 1974 24 p refs

(Contract AT(11-1)-3231)

(COO-3231-2) Avail: NTIS HC \$3.25

The distribution of H₂ photoevolution was surveyed in a variety of marine and fresh water algae. Strains including representatives of all major algal groups, sustained H₂ photoevolution was observed only in *Scenedesmus obliquus* and *Chlamydomonas reinhardtii*. The multicellular, marine red algae produced H₂ but light was not a factor. The effect of the photosynthetic inhibitors dibromothymoquinone and disalicylidenepropanediamine were studied. The results indicate that H₂ may be evolved under the influence of light either from water or a reduced carbon compound. A new enzyme, nonreversible, D-glyceraldehyde-3-P dehydrogenase associated with TPN was recently characterized. This enzyme coupled to photosynthesis in an intact spinach chloroplast has been used to characterize the transportation of substrates across the double membrane. The factors affecting

elimination of glyceraldehyde-3-P such as phosphate, concentration of CO₂, and rate of photosynthesis have been evaluated.

NSA

N75-12550# Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex.

THE TOLERANCE OF BIRDS TO AIRBLAST Final Report
Edward G. Damon, Donald R. Richmond, E. Royce Fletcher, and Robert K. Jones 23 Jul. 1974 38 p refs
(Contract DASA01-70-C-0075)

(AD-785259; DNA-3314F) Avail: NTIS CSCL 06/3

The response of birds to airblast was studied. The direct blast (overpressure) effects in quail, chickens, two-week-old chickens, and geese were determined by placing them at the end of a closed shock tube. Pigeons in-flight were subjected to blast from 64-lb charges. The criteria for direct-blast effects, based on the peak pressures, were no injuries, 5 psi; injuries, 10 psi; and 50-percent mortality, 20 psi. Blast-displacement effects were evaluated by translating quail, chickens, and pigeons from the end of a shock tube. The criteria for blast displacements, based on dynamic-pressure impulse, were no injuries, 5 psi.msec and injuries, 10 psi.msec. Curves relating these criteria as a function of charge weight and ground range were presented.

Author (GRA)

N75-12551# Technische Universitaet, Hanover (West Germany).
THE MOBILITY OF THE HUMAN ARM: MOTION ANALYSIS AND POSSIBILITIES OF A SIMPLIFIED KINEMATICAL PROSTHETIC SYSTEM Ph.D. Thesis [DIE BEWEGLICHKEIT DES MENSCHLICHEN ARMES BEWEGUNGSANALYSE UND MOEGELICHKEITEN EINES VEREINFACHTEN KINEMATISCHEN ERSATZSYSTEMS]

Ghassan Tutungi 1973 145 p refs In GERMAN

Avail: NTIS HC \$5.75

A bionic motion analysis on a healthy human arm is used to determine the positioning of swivel joints in a prosthetic device for armless man.

Transl. by G.G.

N75-12552# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 8, NO. 5, 1974

6 Dec. 1974 146 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 93 p (JPRS-63603) Avail: NTIS HC \$5.75

Man's reactions to space flight stress simulations are studied by observing physiological and psychological indices.

N75-12553 Joint Publications Research Service, Arlington, Va.
NEUROPHYSIOLOGICAL ASPECTS OF INTERACTION OF THE VESTIBULAR SYSTEM WITH OTHER BODY SENSORY SYSTEMS

V. S. Raytses In its Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 3-11

Electrophysiological investigations of the convergence and interaction of afferent signals entering the vestibular system along various sensory channels are considered. The possible contribution of this interaction to the integral activity of the brain and the spatial orientation of the body is discussed.

Author

N75-12554 Joint Publications Research Service, Arlington, Va.
CONCEPT OF THE CHARACTERISTIC TIME OF BIOLOGICAL PROCESSES AND ITS APPLICATION FOR STUDYING THE DYNAMICS OF GAS EXCHANGE

V. K. Vasilyev, N. K. Lukyanov, and A. B. Savvin In its Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 15-24 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 12-17

Measuring the characteristic time of biological processes as a certain function characterizing the rate of metabolic processes is discussed. A method is described for determining the characteristic time of biological processes based on the stability concept. This method can be used to study and analyze oxygen consumption by man after termination of moderate work.

Author

N75-12555 Joint Publications Research Service, Arlington, Va.
CHANGES IN PHYSIOLOGICAL FUNCTIONS OF MONKEYS IN A REDUCED GRAVITATION STAND

G. S. Belkaniya, A. N. Razumeyev, and B. A. Lapin In its Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 24-35 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 17-27

In experiments on monkeys a study was made of the influence exerted on the principal body functions by prolonged presence in a reduced gravitation stand. It is demonstrated that prolonged presence (up to 26 days) under conditions corresponding to terrestrial gravity leads to a decrease in the support reaction, a lability of the cardiovascular system, a decrease in rectal temperature moderate hyperglycemia, an intensification of the diuretic reaction with a decrease in the sodium content in the blood, characteristic changes in the peripheral blood and suppression of the red component of blood formation in the bone marrow. Changes in the EEG and H-reflex reflect the decrease in excitability of central nervous structures and the neuro-muscular system.

Author

N75-12556 Joint Publications Research Service, Arlington, Va.
MORPHOCYTOCHEMICAL REACTION OF THE SUPRARENALS AND THYMIC-LYMPHATIC SYSTEM OF RATS AFTER TERMINATION OF HYPOKINESIA

G. P. Tikhonov and Yu. P. Bizin In its Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 36-40 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 27-30

On the 20th day of hypokinesia rats exhibited a morphocytochemical rearrangement in the suprarenals and in the thymic-lymphatic system which is typical of the stage of chronic resistance of any stress reaction. After the hypokinetic exposure was terminated structural changes in the mentioned organs of rats exhibited another stressed state of their bodies. Immediately after the experiment the animals were intravenously injected with toxic doses of fluorochlorocarbon. The animals exhibited an increased resistance to the poison which seemed to be associated with a high content of corticosteroids in the blood, the compounds having an anti-inflammatory activity.

Author

N75-12557 Joint Publications Research Service, Arlington, Va.
PECULIARITIES IN THE FORMATION OF CATARACTS IN MICE AFTER IRRADIATION BY 645 MeV PROTONS AND Co60 GAMMA RAYS

A. N. Kabachenko In its Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 41-48 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 31-35

The cataractogenic effect of 645-MeV protons and Co60 gamma rays in doses of 100, 200, 400 and 600 rad was studied. The first changes in the crystalline lens of mice were detected eight to ten weeks after irradiation. The duration of the latent period was inversely proportional to the dose of proton and gamma irradiation. The degree and incidence of cataract development were a function of the dose and the time which had elapsed after irradiation. The clinical picture of cataracts induced by 645-MeV proton irradiation was similar to that of the lenticular opacities induced by other radiations. The relative biological effectiveness of 645-MeV protons was equal to unity, as judged by the incidence of the cataracts induced.

Author

N75-12558 Joint Publications Research Service, Arlington, Va.
CONTENT OF GLYCOGEN AND GLUCOSO-6-PHOSPHATASE ACTIVITY IN THE TISSUES OF RABBITS AFTER PROLONGED EXPOSURE TO THE INCREASED PRESSURE OF A HELIUM-OXYGEN ATMOSPHERE

L. G. Ogorodnikova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 49-55 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 35-39

The content of glycogen in the liver, myocardium and skeletal muscles, as well as the glucoso-6-phosphatase activity of the liver of rabbits were investigated during their 10 day exposure in a helium-oxygen atmosphere at a pressure of 350 m H₂O. The pressure seemed to be the major factor determining biochemical changes in animal tissues. Under these experimental conditions metabolic reactions were different in various tissues different with respect to the type of carbohydrate metabolism and function. Author

N75-12559 Joint Publications Research Service, Arlington, Va.
ACTIVITY OF BLOOD ENZYMES IN RABBITS EXPOSED TO HIGH-MOUNTAIN HYPOXIA

V. M. Varvashtyan and A. A. Altymshev *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 56-58 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 39-41

The activity of amylase, aldolase and glucosophosphate isomerase in the blood serum of rabbits increased during the first 15 days of their exposure to high altitude hypoxia (at an elevation of 3,200 m), then decreased slightly and stabilized at a new level by the 60th day. Prolonged increase in enzymic activity can be attributed to an increase in permeability of cell membranes and a change in the metabolic rate. Author

N75-12560 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF THE DYNAMICS OF ACCUMULATION OF TRACE ELEMENTS BY CHLORELLA CELLS DURING PROLONGED CULTIVATION

Ye. I. Pokrovskaya, G. I. Meleshko, V. N. Zhurenko, L. A. Filatkina, and L. B. Zhukova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 59-67 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 41-47

The accumulation of trace elements in the medium and the biomass of *Chlorella* during its 15-day cultivation was studied. The algae were grown in a 16-liter reactor on a recycling nutrient solution with a density of 5 to 7 g matter per liter and a pH = 6 to 7.5. Trace elements were added at a concentration of 2 ml of Arnon mixture and 20 mg of Na EDTA per liter. By the end of the experiment the concentration of iron, copper, manganese, zinc, molybdenum and boron in the medium had increased by a factor of 3-10. It was demonstrated that the accumulation of iron and copper in the mass was linearly related to an increase of these elements in the medium. Author

N75-12561 Joint Publications Research Service, Arlington, Va.
SOME PROBLEMS IN EVALUATING THE VESTIBULAR FUNCTION OF AVIATORS AND COSMONAUTS

K. L. Khilov *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 68-75 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 47-52

Different tests used in the screening of pilots and cosmonauts are reported. These include simulation of situations which can be encountered in actual flight. Particular attention is given to the role of higher parts of the central nervous system played in the inhibition of vestibular autonomic reactions. New possibilities for preventing motion sickness in pilots and cosmonauts are considered. Author

N75-12562 Joint Publications Research Service, Arlington, Va.
SOME REGULARITIES IN ADAPTATION TO PROLONGED ROTATION

R. R. Galle, M. D. Yemelyanov, L. A. Kitayev-Smyk, and A. M. Klochkov *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 76-87 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 53-60

One of the most promising methods for generating artificial gravity in order to prevent the unfavorable effect of weightlessness is rotation of a spacecraft. Presented are findings from clinical and physiological examinations of subjects who were exposed to long term rotation at a velocity of 24-36 deg/sec using an apparatus 20 m in diameter. During the first one or two days the subjects developed symptoms of motion sickness, cardiovascular deconditioning, deterioration of functioning of the analyzers and stress reactions. After six to eight days of adaptation the subjects returned to normal with respect to their health, performance and many physiological parameters. An increased vestibular tolerance persisted for two weeks after termination of prolonged (15 to 29 days) rotation. Author

N75-12563 Joint Publications Research Service, Arlington, Va.
FUNCTION OF PERCEPTION OF SPACE COORDINATES DURING VESTIBULAR TRAINING BY ACTIVE, PASSIVE AND COMPLEX METHODS

I. Ya. Yakovleva, B. B. Bokhov, and L. N. Kornilova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 88-97 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 60-66

The effect of vestibular training was studied by a passive method (repeated exposures to linear accelerations and Coriolis accelerations), by an active method (physical exercises) and by a combined method (a combination of passive and active methods carried out regularly for 6 to 24 months) on the function of perception of space coordinates. All types of vestibular training improved the accuracy of perception of space coordinates, as was demonstrated by vestibular tests. The passive method with linear accelerations yielded the best results. Author

N75-12564 Joint Publications Research Service, Arlington, Va.
REGIONAL HEMODYNAMICS IN ANTIORTHOSTATIC TESTS OF DIFFERENT INTENSITY

D. A. Alekseyev, Kh. Kh. Yarullin, T. N. Krupina, and T. D. Vasilyeva *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 98-107 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 66-72

The optimum angle of inclination and duration were determined for the antiorthostatic test best revealing the adaptive possibilities of cerebral and pulmonary vessels to negative postural effects. Using rheography, photo- and rheoplethysmography the state of cerebral, pulmonary and peripheral circulation was simultaneously studied in 12 test subjects during antiorthostatic tests. Three types of regional hemodynamic changes were observed with respect to the level and time of the postural load: slight, moderate and significant. The training effect of repeated antiorthostatic tests for a negative gravity load was noted. Author

N75-12565 Joint Publications Research Service, Arlington, Va.
WEARING OF ANTI-G SUIT BY PERSONS WITH REDUCED ORTHOSTATIC STABILITY

V. A. Gornago, Yu. D. Pometov, B. F. Asyamolov, V. S. Panchenko, and B. S. Katkovskiy *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 108-112 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 5, 1974 p 73-75

Four test subjects exhibited a significantly lowered orthostatic stability as a result of a 30-day exposure to an antiorthostatic position. Then the subjects donned an anti-g suit by means of which lower body positive pressure was provided. The effect of

lower body positive pressure on gas exchange and hemodynamics was studied. During a test with the subjects all wearing a suit and in an erect position they exhibited a decreased heart rate and respiratory minute volume and an increased minute volume of respiration, oxygen pulse and CO₂ concentration in the alveolar gas. It is concluded that the orthostatic stability of man can be increased by means of lower body positive pressure. Author

N75-12566 Joint Publications Research Service, Arlington, Va. **EFFECT OF 30-DAY HYPOKINESIA ON THE DYNAMICS OF HIGHER NERVOUS ACTIVITY AND SLEEP OF AN OPERATOR**

V. N. Artishuk, A. N. Litsov, V. P. Stupnitskiy, and Yu. V. Yakushkov *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 113-117 Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 8, no. 5, 1974 p 75-79

Operators exhibited three main periods during a 30-day bedrest experiment: (1) the first period was characterized by adequate reactions to exposures, good mood, excellent performance and sound sleep at night; (2) the second period was characterized by instability of mood, inadequate reactions to the changing environment, indications of group incompatibility, worsened performance and poor sleep at night; and (3) the third period was characterized by increased psychic activity, reduced number of complaints about poor health and fatigue, stabilization of performance and an insignificant improvement of night sleep. Physical exercises and electric stimulation of the muscles during bedrest and rehabilitation periods exerted a positive effect on the dynamics of higher nervous activity of the test subjects. Author

N75-12567 Joint Publications Research Service, Arlington, Va. **OPTIMIZATION OF TIME VARIABLE THICKNESS OF RADIATION PROTECTION AGAINST SOLAR FLARE PROTONS**

V. A. Sakovich *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 118-120 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 8, no. 5, 1974 p 79-80

The stochastic nature of solar flare protons is analyzed in relation to radiation danger during space flights and the creation of optimal shielding for manned spacecrafts. The dosage of solar flare protons behind the shielding is computed on the basis of the assumption that all protons are characterized by some averaged spectrum, the risks derivative for shielding thickness, and the duration of man's presence in the various spacecraft compartments. G.G.

N75-12568 Joint Publications Research Service, Arlington, Va. **CHAMBER FOR DECOMPRESSING THE CAUDAL PART OF THE ANIMAL BODY**

V. G. Voloshin and V. A. Sichkar *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 121-123 Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 8, no. 5, 1974 p 81-82

A decompression chamber for the lower part of an animal is designed that incorporates a slide carrier, connecting wall pieces for the introduction of measuring instruments, and a diaphragm for sealing the entrance window and ensuring rarefaction volume in the test chamber. G.G.

N75-12569 Joint Publications Research Service, Arlington, Va. **RESPIRATORY ACTIVITY SENSOR USING CONDUCTING PAPER**

N. A. Karnaukhova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 124-126 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 8, no. 5, 1974 p 82-84

A tensometric sensor is developed that utilizes a stack of conducting paper held between metal plates to measure the external respiration function. The relationship between sensor resistance and compression force is inversely proportional. Registry of the pneumogram includes a device for transforming the change in chest perimeter during inhalation/exhalation into the compressive force of the sensor for automatic voltage recording. G.G.

N75-12570 Joint Publications Research Service, Arlington, Va. **ECG CHANGES IN THE MX, DS AND MC LEADS IN CASES OF FOCAL AND DIFFUSE DAMAGE TO THE CARDIAC MUSCLE**

A. G. Zerenin, V. A. Talavrinov, L. S. Ambatyello, I. M. Grishina, and M. V. Sokolovskaya *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63606) 6 Dec. 1974 p 127-130 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 8, no. 5, 1974 p 84-85

The ECG leads MX, DS, and MC make it possible to determine diffuse changes in the myocardium of ischemic cardiac patients. Focal damage is detected most frequently on the MC leads and in almost half of all investigated cases in the MX and DS leads. Only the DS lead makes a more definite localization of these changes possible. G.G.

N75-12571 Joint Publications Research Service, Arlington, Va. **PHAGOCYtic ACTIVITY OF HUMAN BLOOD NEUTROPHILS UNDER ORDINARY CONDITIONS OF VITAL FUNCTIONING AND IN AN ISOLATION CHAMBER**

M. V. Markaryan *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 131-134 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 8, no. 5, 1974 p 85-87

Changes in the phagocytic activity of human blood are connected to seasonal variations of biological reactions. Relatively low indices for the absorptive function of neutrophils are found during November and December, with a statistically reliable increase in stimulation shown during the spring-summer months. G.G.

N75-12572** Stanford Univ., Calif. **COLLABORATIVE RESEARCH IN CARDIOVASCULAR DYNAMICS AND BONE ELASTICITY Final Report**

Oct. 1974 14 p ref
(Grant NGL-05-020-223)
(NASA-CR-140997) Avail: NTIS HC \$3.25 CSCL 06P

A collaborative research program covering a variety of topics of biomechanics and biomedical engineering within the fields of cardiovascular dynamics, respiration, bone elasticity and vestibular physiology is described. The goals of the research were to promote: (1) a better understanding of the mechanical behavior of the circulatory system and its control mechanisms; (2) development of noninvasive methods of measuring the changes in the mechanical properties of blood vessels and other cardiovascular parameters in man; (3) application of these noninvasive methods to examine in man the physiological effects of environmental changes, including earth-simulated gravitational changes; and (4) development of in-flight methods for studying the events which lead to post-flight postural hypotension. Author

N75-12573** National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va. **PROTON TISSUE DOSE FOR THE BLOOD FORMING ORGAN IN HUMAN GEOMETRY: ISOTROPIC RADIATION**

G. S. Khandelwal and John W. Wilson Washington Dec. 1974 21 p refs
(NASA-TM-X-3089; L-9628) Avail: NTIS HC \$3.25 CSCL 06P

A computer program is described which calculates doses averaged within five major segments of the blood forming organ in the human body taking into account selfshielding of the detailed body geometry and nuclear star effects for proton radiation of

arbitrary energy spectrum (energy less than 1 GeV) and isotropic angular distribution. The dose calculation includes the first term of an asymptotic series expansion of transport theory which is known to converge rapidly for most points in the human body. The result is always a conservative estimate of dose and is given as physical dose (rad) and dose equivalent (rem). Author

N75-12574*# Naval Aerospace Medical Research Lab., Pensacola, Fla.

CRITERIA FOR PERSONAL DOSIMETRY IN MIXED RADIATION FIELDS IN SPACE

Hermann J. Schaefer 16 Sep. 1974 22 p refs

(NASA Order T-43310-G)

(NASA-CR-140365; NAMRL-1208) Avail: NTIS HC\$3.25 CSCL 06R

The complexity of direct reading and passive dosimeters for monitoring radiation is studied to strike the right balance of compromise to simplify the monitoring procedure. Trapped protons, tissue disintegration stars, and neutrons are analyzed.

Author

N75-12575# Royal Aircraft Establishment, Farnborough (England).

COMPLEX PSYCHOPHYSIOLOGICAL EVALUATION OF THE READABILITY OF SYMBOLIC INFORMATION

L. D. Chainova, I. A. Komarova, and F. I. Zonabend Oct. 1974 18 p refs Transl. into ENGLISH from Vop. Psikologii (USSR), v. 16, no. 2, 1970 p 163-168

(RAE-Lib-Trans-1777; BR44130) Avail: NTIS HC \$3.25

Slides of conventional cartographic symbols varying in number were exposed for two seconds. Twelve such symbols were selected experimentally to cover the range of difficulty. Recordings were then made on ten subjects of their EEG, GSR, EMG, and electro-oculogram (EOG) in a recognition task in which the number and difficulty of the symbols were varied. The GSR, EOG, and EEG measures were found to reflect the condition of the visual system best. The results obtained make it possible to make decisions regarding information saturation of the visual field, ways of representing symbols, exposure time, and individual differences.

Author

N75-12576# Research Inst. of National Defence, Stockholm (Sweden).

RECOVERY TIME AFTER BEING DAZZLED, AS A FUNCTION OF AGE [ÅTERHAMTNINGSTID EFTER BLÄNDNING SOM FUNKTION AV ÅLDER]

Brian Hogman, Bjoern Tengroth, Jane Thorburn, and Goeran Oernberg Jan. 1973 10 p refs In SWEDISH

(FOA-2-C-2587-E1) Avail: NTIS HC \$3.25

The ability of the eye to recover or its readaptation (RAT) after photostress depends on a number of factors such as the light characteristics of the dazzle source, angle of vision, level of adaptation, etc. This capacity of recovery is also influenced by the individual's age. The report deals with RAT studies on different age groups. For this, the opto-kinetic nystagmus (OKN) has been used. OKN has been recorded by EOG technique. The results show that the different age groups differ mainly at low background luminance.

Author

N75-12577# Research Inst. of National Defence, Stockholm (Sweden).

DETECTABILITY OF AN UNSHARP EDGE IN ADDITIVE NOISY BACKGROUND

Torleiv Orhaug and Rune Johansson Jan. 1973 37 p refs

(FOA-2-C-2591-E1-H5) Avail: NTIS HC \$3.75

The results of perception experiments are reported which were aimed at studying the observer's ability to detect an edge of varying sharpness, intensity and area. The edge was observed against a background of additive, normally distributed noise. The results have been analyzed with allowances for the background noise characteristics and the visual systems characteristics. They can be described by a linear detection model whose characteristics comprise spatial derivation and integration of the visual stimulus pattern.

Author

N75-12578# Research Inst. of National Defence, Stockholm (Sweden).

CHANGES IN MASS OF BIOLOGICAL CELLS WHEN IRRADIATED WITH Q-PULSED RUBY LASER [FOERÄNDRING AV MASSAN HOS BIOLOGISKA CELLER VID BESTRÄLNING MED Q-PULSAD RUBINLASER]

Benkt Rosengren and B. Tengroth Jan. 1973 9 p refs In SWEDISH

(FOA-2-C-2586-E6) Avail: NTIS HC \$3.25

The instantaneous changes in mass of colored biological cells when irradiated with a Q-pulsed ruby laser have been studied. The mass change has been measured with the aid of X-ray absorption technique. A mass increase for cells in a surrounding liquid was obtained when irradiated at 6 MW/sq cm. Without the liquid, a reduction in cell mass was measured, with irradiation at 0.9 MW/sq cm.

Author

N75-12579# Royal Aircraft Establishment, Farnborough (England).

PROCEDURE FOR THE ISOLATION AND DETERMINATION OF ALDOSTERONE IN HUMAN URINE BY THIN-FILM CHROMATOGRAPHY ON POLYAMIDE AND BTC MICRO-REACTION

W. Hoelzel and M. Buechner Sep. 1974 8 p refs Transl. into ENGLISH from Acta Biol. Med. German. (East Germany), v. 19, 1967 p 189-192

(RAE-Lib-Trans-1778; BR43708) Avail: NTIS HC \$3.25

The procedure was developed to isolate the aldosterone liberated in urine after pH1-hydrolysis, by thin layer chromatography on polyamide, following extraction with chloroform, and to determine it quantitatively with blue tetrazolium chloride (BTC) in solution. The process involves a simple working method and a relatively small expenditure of time, and so seems to offer good prospects for routine investigations.

Author

N75-12580*# Kentucky Univ., Lexington. Wenner-Gren Research Lab.

A FEASIBILITY STUDY OF LIMB VOLUME MEASURING SYSTEMS

J. F. Lafferty and W. M. Carter Sep. 1974 56 p refs

(Contract NAS9-12749)

(NASA-CR-140330) Avail: NTIS HC \$4.25 CSCL 06P

Evaluation of the various techniques by which limb volume can be measured indicates that the odometric (electromechanical) method and the reflective scanner (optical) have a high probability of meeting the specifications of the LBNP experiments. Both of these methods provide segmental measurements from which the cross sectional area of the limb can be determined.

Author

N75-12581# Washington Univ., Seattle.

DETERMINATION OF TOTAL BODY CALCIUM (SKELETAL MASS) IN MAN BY IN VIVO NEUTRON ACTIVATION ANALYSIS AND TOTAL BODY COUNTING Progress Report, 1 Jul. 1973 - 30 Jun. 1974

W. B. Nelp 20 Mar. 1974 47 p refs Prepared in cooperation with Battelle-Northwest, Richland, Wash.

(Contract AT(45-1)-2225)

(TID-26613) Avail: NTIS HC \$3.75 CSCL 06P

Bone mass in relation to the therapy of osteoporosis was studied. By collecting Ar-37 from exhaled breath following whole-body neutron activation, total body calcium can be determined. Data are available for 33 normal males and females from ages 21 to 80. Instrumentation development is described.

NSA

N75-12582# Texas Univ., San Antonio. Health Science Center.

THE CONTROL OF THE CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEM Interim Report, 1 Apr. 1973 - 31 Mar. 1974

Vernon S. Bishop, Kenneth Blum, Arthur H. Briggs, Oliver Carrier, Jr., and Miguel A. Medina 1974 33 p refs

(Grant AF-AFOSR-2074-71; AF Proj. 9777)

(AD-784933; AFOSR-74-1336TR) Avail: NTIS CSCL 06/19

Cardiovascular studies indicated the importance of beat-to-beat regulation of heart rate via the aortic nerve, the importance of the pericardium in minimizing stresses, and following positive acceleration in unprotected subjects acute cardiopulmonary congestion may occur in the post-acceleration period. Thus, subtle changes in adaptive mechanisms are important defensive mechanisms against the stresses employed. Other studies indicate that with a high -G force there is inhibition of ethanol sleep time response but with a low -G force augmentation of sleep time is produced. These may lead to important clues as to the nature of chemical changes and the effects of drugs taking place during acceleration. Studies on the effects of immobilization on muscle function indicate there is increased Ca^{2+} activity which may account for the abnormal contractile function and may lead to important implications in prevention of muscle atrophy during immobilization. (Modified author abstract) GRA

N75-12583# School of Aerospace Medicine, Brooks AFB, Tex. **AIRCRAFT ACCIDENT MEDICAL INVESTIGATOR'S KIT Final Report, 1970 - 1974**

Paul J. Sheffield, David A. Davolt, and Robert M. Adams Sep. 1974 35 p refs

(AD-785389; SAM-TR-74-43) Avail: NTIS CSCL 06/12

A prototype kit developed for medical teams engaged in aircraft accident investigation provides all essential items needed: to collect biological samples; to obtain photographic evidence; to record the relative locations of victims and their life support equipment; to record and preserve verbal comments; to communicate by radio between team members; and to maintain the investigator's personal effectiveness. Two prototype kit versions have been used extensively by medical personnel during field training exercises wherein aircraft accident investigation is taught. They have also been used in the investigation of several general aviation accidents. Two identical sets are being evaluated at widely separated Air Force bases, both engaged in large-scale flight training activities. Preliminary reports indicate that a standard kit would be useful for thorough aircraft investigation by medical personnel. (Modified author abstract) GRA

N75-12584# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

VIBRATION DISEASE AND ITS PATHOGENESIS

E. C. Andreeva-Galanina and N. I. Karpov 21 Aug. 1974 20 p refs Transl. into ENGLISH from Uch. Zap. Nauch. Issled. Inst. Giyeny (Moscow), 1968 p 14-26

(AD-785202; FTD-MT-24-1025-74) Avail: NTIS CSCL 06/19

Pathogenesis of the onset and development of the vibration disease is connected with a complex interacting chain of neurohumoral and reflex-developing changes in the activity of the various regions of the nervous system (peripheral and central). In the advanced stages, vibration can lead to degenerative processes in the nervous system, vascular system, and muscles. The only favorable recommendation is early diagnosis and a rational job placement. GRA

N75-12585*# Massachusetts Inst. of Tech., Cambridge. **MODEL OF HUMAN DYNAMIC ORIENTATION Ph.D. Thesis**

Charles C. Ormsby 1974 253 p refs (Grant NGR-22-009-701)

(NASA-CR-132537) Avail: NTIS HC \$8.50 CSCL 05J

The dynamics associated with the perception of orientation were modelled for near-threshold and suprathreshold vestibular stimuli. A model of the information available at the peripheral sensors which was consistent with available neurophysiologic data was developed and served as the basis for the models of the perceptual responses. The central processor was assumed to utilize the information from the peripheral sensors in an optimal (minimum mean square error) manner to produce the perceptual estimates of dynamic orientation. This assumption, coupled with the models of sensory information, determined the form of the model for the central processor. The problem of integrating information from the semi-circular canals and the otoliths to

predict the perceptual response to motions which stimulated both organs was studied. A model was developed which was shown to be useful in predicting the perceptual response to multi-sensory stimuli. Author

N75-12586# Research Inst. of National Defence, Stockholm (Sweden).

VARIABILITY IN REACTION RESPONSE [REAKTIONSBEREDSKAPENS VARIABILITET]

Hans-Gunnar Helgeson and Rune Johansson Dec. 1972 47 p refs In SWEDISH

(FOA-2-C-2581-H5) Avail: NTIS HC \$3.75

An experiment was carried out in which the reactions of test personnel to 8 bright points generated in random order, on a PDP-12-display, were recorded by the use of 8 keys on a teletypewriter. The conditions were: Untrained and rested, untrained and tired, trained and rested, trained and tired. Training reduced the average time of reaction and its spread. Tiredness increased the number of errors. The quality effectiveness was periodic. Reactions close together show positive correlation. The reaction times show an irregular fine oscillation of about 8 to 10 seconds time of oscillation and a coarse oscillation average 4 minutes (which is equivalent to oscillations in attention and more pronounced periods of tiredness respectively). Author

N75-12587# Advisory Group for Aerospace Research and Development, Paris (France).

SIMULATION AND STUDY OF HIGH WORKLOAD OPERATIONS

A. N. Nicholson, ed. (RAF Inst. of Aviation Med.) Oct. 1974 126 p refs Presented at the Aerospace Med. Panel Specialist Meeting, Oslo, 24-25 Apr. 1974

(AGARD-CP-146) Avail: NTIS HC \$5.75

The use of simulation for the evaluation of aircrew performance in high operational work load situations is considered.

N75-12588 School of Aerospace Medicine, Brooks AFB, Tex. **SYSTEMS SIMULATION: A GLOBAL APPROACH TO AIRCREW WORKLOAD**

Harry M. Hughes, Bryce O. Hartman, Raul Garcia, and Paul Lozano In AGARD Simulation and Study of High Workload Operations Oct. 1974 14 p

Aircrew workload can be studied at many different levels of detail. In the most general sense, it is a function of the total workload imposed upon a unit in relation to the number of crews in that unit. An airlift system simulation program has been designed using this global approach and a number of simulation studies have been performed. Outcomes in terms of systems effectiveness measures, crew workload, and crew welfare measures will be presented. Author

N75-12589 National Aerospace Lab., Amsterdam (Netherlands). **A SIMULATOR STUDY TO INVESTIGATE HUMAN OPERATOR WORKLOAD**

P. H. Wewerinke and J. Smit In AGARD Simulation and Study of High Workload Operations Oct. 1974 6 p refs

Human response characteristics in control situations of widely varying difficulty were studied. The experiment was aimed at a better understanding of the human operator limitations in terms of control effort as included in the optimal control model. Based on the experimental results a control effort index is presented. The predicted control effort correlates excellently with subjective ratings and seems to have a useful generality. Author

N75-12590 Royal Aircraft Establishment, Farnborough (England). Human Factors Group.

LABORATORY RESEARCH INTO HUMAN INFORMATION PROCESSING

Jo H. F. Huddleston In AGARD Simulation and Study of High Workload Operations Oct. 1974 3 p

Pilot workload can be expressed as the coping with two main clusters of problem. One cluster is equipment based and theoretically amenable to physical modelling, even replacement. The other cluster is emphatically to do with humanity; to do with those elusive personal gambles on which life is felt to depend. Pilot workload might be the maintenance of a mental model encompassing these two kinds of time varying input; the continued provision of a mental solution for two sources of uncertain problem. Respectable transfer function work considers varied inputs, monitor outputs, and debate black box contents with a rare freedom. Author

N75-12591 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

EVALUATING MEASURES OF WORKLOAD USING A FLIGHT SIMULATOR

J. M. Rolfe, J. W. Chappelow, R. L. Evans, S. J. E. Lindsay, and A. C. Browning (RAE) *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 13 p refs

A flight instrument trainer, resembling a twin jet communications aircraft, was used to evaluate questionnaire, performance and activity analysis measures of pilot workload. Attempts were made to distinguish between the physical, perceptual and mental components of workload. For this purpose three flight plans were devised, of approximately equal duration, differing markedly with respect to the three above components. Six professional pilots flew each flight plan and after landing completed questionnaires to assess the workload levels and the task content. During the flights video recordings were made of the pilot's manual and communication activity. From the measures it was possible to obtain significantly different results relating to the different flight plans. These results were capable of distinguishing between the three components of workload represented in the flights. Author

N75-12592 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

A FLIGHT SIMULATOR STUDY OF MISSILE CONTROL PERFORMANCE AS A FUNCTION OF CONCURRENT WORKLOAD

K. G. G. Corkindale *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 6 p refs

Eight pilots took part in a part task simulation of the delivery of a stand-off air-to-surface guided weapon. The attack phase of a sortie was simulated. This phase lasted some 3 minutes and included a low level run to the weapon release area, weapon release, target detection on the TV monitor display and the aiming of the missile at the target. Four levels of workload were studied. The results showed that: (1) performance at the missile control was degraded by increases in concurrent workload; and (2) manual flight control and auto-pilot monitoring were adversely affected by concurrent missile control tasks. Author

N75-12593 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

SIMULATION OF HIGH WORKLOAD OPERATIONS IN AIR TO AIR COMBAT

F. M. Holden, D. B. Rogers, and C. R. Replogle *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 4 p refs

Workload measurements for the study and analysis of human performance are analyzed to provide effectiveness versus design data with specific examples from air to air combat man-in-the-loop simulations. The report concludes with a discussion of man-in-the-loop simulation as a technique for system specific human performance data and as a source for the data required to develop general methods and techniques for predicting the performance of manned weapon systems. Author

N75-12594 Dunlap and Associates, Inc., La Jolla, Calif.

PILOT LANDING PERFORMANCE UNDER HIGH WORKLOAD CONDITIONS

C. A. Britson *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 10 p refs

A longitudinal study of pilot carrier landing performance was conducted to describe the influence of prolonged operations on pilot performance. A landing performance criterion previously validated in a fleet environment was used to measure and compare pilot and squadron performance variations over time. Three levels of cumulative workload were defined to evaluate concomitant changes in performance associated with each workload. Pilot landing performance improved over time with more improvement found in night performance than day. The influence of practice on carrier landings is discussed in relation to high cumulative workload. The performance criterion was used to identify potential night pilots on the basis of landing proficiency. High and low proficiency pilots also were identified and diagnostic training information provided. Author

N75-12595 Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

AIRCREW WORKLOAD AND HUMAN PERFORMANCE: THE PROBLEM FACING THE OPERATIONAL COMMANDER

W. D. Macnamara *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 5 p refs

The information available to an operational commander on the reliability and serviceability of the human component in the air weapons system is limited when compared to that available for the aircraft and other systems components. The common use of total flying hours does not provide the commander with information consistent with that now available from aircrew workload and performance studies. A basis for and the background in the development of a trail approach to providing commanders with better information on the human component is described. Author

N75-12596 School of Aerospace Medicine, Brooks AFB, Tex. Environmental Physiology Branch.

ENDOCRINE-METABOLIC INDICES OF AIRCREW WORKLOAD: AN ANALYSIS ACROSS STUDIES

Henry B. Hale, Richard C. McNee, James P. Ellis, Jr., Ralph R. Bollinger, and Bryce O. Hartman *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 6 p refs

Endocrine metabolic measures have been subjected to a cross-sectional analysis in an effort to ascertain the basic relation of endocrine metabolic activity to the workload in either actual or simulated flights. For the present purpose, load represents degree of flight difficulty multiplied by duration. Difficulty was based upon USAF expert rankings, and duration was based upon fractions of a day. Multiple linear regression analysis was performed on data for urinary epinephrine, norepinephrine, 17-OHCS, urea, Na, K, and the Na/K ratio. This report presents the findings in the first phase of the cross-sectional study. Author

N75-12597 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

TIME DEPENDENCE OF THE FLIGHT INDUCED INCREASE OF FREE URINARY CORTISOL SECRETION IN JET PILOTS

G. Ulbrecht, E. Meier, R. Rothenfusser, and K. V. Werder *In AGARD Simulation and Study of High Workload Operations* Oct. 1974 6 p refs

A modified competitive protein binding assay of free urinary cortisol using a single solvent extraction and a cortisol binding globulin from a dexamethasone suppressed male subject was developed. The separation of bound and free cortisol was performed by adsorption of the free cortisol to dextran coated charcoal. The sensitivity of the method allows to measure as low as 0.2 ng per tube. In seven F-104 pilots flying two missions a day the 24 hr free urinary cortisol secretion was significantly higher compared to 12 pilots on day of rest. When 26 F-104 pilots, 12 RF 4E pilots and 14 weapon system operators (WSO)

were evaluated by measuring free urinary cortisol excretion in short intervals it could be demonstrated, that only the pilots flying early in the morning showed an enhancement of adrenocortical activity compared to normal controls, suggesting a change of excitability of the hypothalamo-pituitary-adrenal system during the day. Author

N75-12598 Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

EMOTIONAL AND BIOCHEMICAL EFFECTS OF HIGH WORKLOAD

William B. McHugh, Paul Naitoh, and C. A. Brictson (Dunlap and Associates, Inc., La Jolla, Calif.) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 9 p refs

A preliminary longitudinal multifactorial study of the inter-relationships of biochemical, mood, biographical factors and landing performance under high work load conditions has been carried out with U. S. Naval Aviators. Levels of serum cholesterol, serum uric acid, blood lactate, pyruvate, and mood assessments were made during periods of non-flying activity and during periods of increased cumulative work load. Uric acid values fell during moderate cumulative work load, and cholesterol values fell during high cumulative work load. Increased variability of pyruvate and lactate were noted with increased cumulative work load. Increased cumulative work load did not affect emotions or performance but altered mood association patterns and altered the relationships of mood and performance. Experience was correlated with performance under zero cumulative work load conditions. Emotion correlated with performance under high cumulative work load conditions. Author

N75-12599 Dunlap and Associates, Inc., La Jolla, Calif.

PREDICTION OF PILOT PERFORMANCE: BIOCHEMICAL AND SLEEP-MOOD CORRELATES UNDER HIGH WORKLOAD CONDITIONS

C. A. Brictson, W. B. McHugh (Navy Med. Neuropsychiatric Res. Unit), and P. Naitoh (Navy Med. Neuropsychiatric Res. Unit) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 10 p refs

A preliminary longitudinal study of the factors affecting the carrier landing performance of naval aviators under high workload conditions has been carried out. Using stepwise multiple regression techniques, a substantial portion of the variability in landing performance could be accounted for by six factors under zero cumulative workload conditions and by seven factors under moderate cumulative workload conditions. High cumulative workload conditions sharply reduced predictive ability. Although specific aircraft experience and total flight experience were important predictors of average landing performance, blood biochemical levels and emotional states had significant predictive ability. Sleep patterns relate strongly to performance. The factors that determine landing performance change as cumulative as workload increases. Author

N75-12600 Royal Air Force Strike Command, High Wycombe (England).

LONG RANGE AIR-TO-AIR REFUELLING: A STUDY OF DUTY AND SLEEP PATTERNS

N. H. Mills and A. N. Nicholson (RAF Inst. of Aviation Med.) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 9 p refs

The sleep patterns of ground crew, pilots and tanker crews involved in a long range air-to-air refuelling mission have been related to their duty hours. During such complex operations workload may vary considerably and the demands placed on some aircrew may be very high. It is suggested that the duty hours demanded of individual aircrew should be related to their overall workload. In this way it may be possible to maintain an acceptable sleep pattern in all aircrew and ensure that no individual pilot or crew member is subjected to excessive duty hours. Author

N75-12601 Supreme Headquarters Allied Powers Europe (SHAPE), Casteau (Belgium).

HIGH WORKLOAD TASKS OF AIRCREW IN THE TACTICAL STRIKE, ATTACK AND RECONNAISSANCE ROLES

F. TerBraak *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 3 p

High workload tasks are outlined for aircrew performing three distinct tactical roles, namely the strike, the attack and the reconnaissance roles. The total mission is covered, which is from the time the pilot receives his orders until the debriefing following the flight has been completed. At the same differences between each role, as related to workload, are printed out so that a fairly realistic comparison can be made as to the workload of each category. Author

N75-12602 Royal Air Force, Binbrook (England).

THE AIR DEFENCE ROLE

J. Hutchinson *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 5 p

In considering the workload involved in the air defense role, it is important to be clear as to the dimensions of the subject. On the one hand, any air defense situation will pose a problem which can be defined in absolute mathematical terms, and whose solution implies a certain degree of effort. The essence of air defense is that the intruder will set about making the defender's task as difficult as possible; the tactics he adopts, in addition to making the problem less tractable, may also reduce, through stress, fatigue, fear or several more factors the ability of the air defense crew to solve the problem. The perceived workload facing the crews whose ability is thus impaired may prove to be beyond their capability. Pilots need training against all possible threats from supersonic air launched missiles at high level, through high subsonic bomber penetrations at low level, to air combat manoeuvring against fighter-type aircraft. This range of possibilities includes head-on, beam and rear attacks with missiles, guns or both, pressed home either semi-automatically using electronically computed steering information, or visual information. Author

N75-12603 School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGICAL COSTS OF EXTENDED AIRBORNE COMMAND AND CONTROL OPERATIONS

Ralph R. Bollinger, Robert D. O'Donnell, and Bryce O. Hartman *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 9 p ref

During Exercise Night Star the personnel of the National Emergency Airborne Command Post successfully documented their ability to maintain a continuous airborne alert for an extended period. Biomedical evaluation showed that performance was maintained by the mission teams, flight crews, and ground support personnel. When significant fatigue did occur, whether in flight or on the ground, it developed near the beginning of the exercise. The only cases of marked or persistent fatigue were seen in those groups whose day/night, work/rest cycles were shifted and can be attributed in major part to the resulting sleep loss. However, all groups appeared to adapt to their new work schedules as the exercise progressed. Author

N75-12604# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

EFFECTS OF VARIOUS RUNWAY LIGHTING PARAMETERS UPON THE RELATION BETWEEN RUNWAY VISUAL RANGE AND VISUAL RANGE OF CENTERLINE AND EDGE LIGHTS IN FOG Final Report

Richard F. Haines Dec. 1973 75 p refs

(Contract DOT-FA73WAI-348)

(NASA-TM-X-72112; AD-785320; FAA-RD-73-170) Avail: NTIS HC \$4.25 CSCL 01/3

Thirty six students and 54 commercial airline pilots were tested in the fog chamber to determine the effect of runway edge and centerline light intensity and spacing, fog density, ambient luminance level, and lateral and vertical offset distance of the subject from the runway's centerline upon horizontal

visual range. These data were obtained to evaluate the adequacy of a balanced lighting system to provide maximum visual range in fog viewing both centerline and runway edge lights. The daytime system was compared against two other candidate lighting systems; the nighttime system was compared against other candidate lighting systems. The second objective was to determine if visual range is affected by lights between the subject and the farthestmost light visible through the fog. The third objective was to determine if college student subjects differ from commercial airline pilots in their horizontal visual range through fog. Two studies were conducted. GEA

N75-12605# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).

NEW OR NEWLY TESTED METHODS FOR THE ASSESSMENT OF PILOTS' WORKLOAD [NEUARTIGE BZW. IN DER ERPROBUNG BEFINDLICHE VERFAHREN ZUR ABSCHAETZUNG DER PILOTENBELASTUNG]

2 May 1974 98 p refs In GERMAN; ENGLISH summary Proc. of the 14th DGLR Anthropotech. Meeting, Munich, 27 Nov. 1973

(DLR-Mitt-74-19) Avail: NTIS HC \$4.75; ZLDI, Munich 22 DM

A quantitative analysis of psychophysical load in performing complex tasks was made. Pulse frequency sinusoidal arrhythmia of pilots and flight control personnel were measured. Results of simulation of a STOL landing for measuring stress in operators were given. A method was devised for evaluating work load in flight security personnel.

N75-12608 Technische Universitaet, Munich (West Germany). Inst. fuer Ergonomie.

QUANTITATIVE ANALYSIS OF PSYCHOPHYSICAL STRESS IN OPERATING COMPLEX DYNAMIC SYSTEMS [ZUR QUANTITATIVEN ANALYSE DER PSYCHOPHYSISCHEN BEANSPRUCHUNG BEI DER BEDIENUNG KOMPLEXER DYNAMISCHER SYSTEME]

Heinz Schmidtke In DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 8 p In GERMAN

The relative value of physiological and psychological factors in determining workload in complex situations is discussed with a view to establishing quantitative methods of analysis. ESRO

N75-12607 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

PSYCHOPHYSIOLOGICAL STRESS INVESTIGATIONS OF AN INSTRUMENT-COORDINATION ANALYZER [PSYCHOPHYSIOLOGISCHE BELASTUNGSUNTER-SUCHUNGEN AN EINEM INSTRUMENTEN-KOORDINATIONS-TESTGERAET (ICA)]

K. F. Klein In DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 10 p In GERMAN

Heart and respiratory rate, skin resistance, and eyelid flickering data were monitored during operation of a pilot selection apparatus allowing complex instrument coordination tasks to find standardized stress-physiological response correlations. Results indicate strong expectation tenseness before tests while, during performance, heart and respiratory rate decrease. Continuous or growing workloads ameliorate heart rate. ESRO

N75-12608 Technische Universitaet, Munich (West Germany). Inst. fuer Arbeitsphysiologie.

HEART RATE AND SINUSOIDAL ARRYTHMIA MEASUREMENT IN VIEW OF OBJECTIVATING CONCENTRATION AND STRESS IN CONTROL TASKS [HERZFREQUENZ- UND SINUSARRHYTHMIE-MESSUNGEN ZUR FRAGE DER OBJEKTIVIERUNG VON KONZENTRATION UND BEANSPRUCHUNG IN REGELAUFGABEN]

Helmuth Strasser In DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 24 p refs

In GERMAN

Mental effort during control tasks such as pursuit tracking tests was correlated with heart rate, low frequency arrhythmia, and high frequency sinus arrhythmia profiles monitored for several hours. Results show that pulse frequency and sinusoidal arrhythmia appear in a somewhat reciprocal relation. Sinus arrhythmia, though varying greatly among individuals, is a reliable parameter which provides supplementary information when test linked factors cease to show up in pulse frequency. ESRO

N75-12609 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Abteilung Anthropotechnik.

MEASUREMENT AND ESTIMATION PROCEDURE FOR FLIGHT SAFETY CONTROL OPERATOR WORKLOAD [VERFAHREN ZUR MESSUNG UND ABSCHAETZUNG DER ARBEITSBELASTUNG AN FLUGSICHERUNGSARBEITS-PLAETZEN]

R. Seifert, H. Gollwitzer, K. Brauser, and S. Straubel In DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 20 p refs In GERMAN

The workload of air traffic control personnel tends to increase rapidly, consequently, an evaluation of workload in specific locations was devised on the basis of operators' tasks, control boards categorization, and parameter choice. Observed radar operators were also subjected to standard interviews for autocriticism and correlation with measured data. Standardized appraisal of different locations in German airports led to an evaluation of mean control capacity in the Federal Republic of Germany. ESRO

N75-12610 Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).

ERROR CONTROL IN ESTIMATION OF PILOT STRESS BY MEASURING SKIN RESISTANCE [UEBER VERMEIDBARE FEHLER DER MESSMETHODIK BEIM ABSCHAETZEN DER PILOTENBELASTUNG VERMITTELS ELEKTRISCHER HAUTWIDERSTANDSMESSUNGEN]

Kurt Gratzl In its New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 16 p refs In GERMAN

The choice of electrodes and solvents affecting skin physiology is discussed for skin treatment. The use of gold electrodes and tampons dipped in physiological solution is considered. Skin resistance varies according to dermatome distribution and homerostosis of internal organs projecting on the dermatome. The representation of skin resistance measurements is discussed. ESRO

N75-12611 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

APPLICATION OF HUMAN FACTORS ENGINEERING DATA IN MEDICAL EVALUATION OF FLIGHT CREWS [ANWENDUNG ANTHROPOTECHNISCHER DATEN BEI DER FLUGMEDIZINISCHEN BEURTEILUNG FLIEGENDER BESATZUNGEN]

H. J. Grunhofer In DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 4 p In GERMAN

To allow correct evaluation of the critical static and dynamic functions of a pilot in the cockpit of his own airplane, a cockpit simulator was constructed allowing exact reproduction of angles and distances from controls and from displays of the most important instruments. The control boards were changed to reproduce exactly the real situation in flight and panels displaced to allow evaluation of freedom of movement also in emergency situations such as ejection of a wounded pilot. ESRO

N75-12612# Wright State Univ., Dayton, Ohio. Dept. of Psychology.

VISUAL INFORMATION PROCESSING OF COMPLEX IMAGERY Final Report, 15 Dec. 1972 - 25 Mar. 1974

Allan Pantle Jul. 1974 130 p refs (Contract F33615-73-C-4031; AF Proj. 7233)

(AD-786386; AMRL-TR-74-43) Avail: NTIS CSCL 05/10

An analysis of extant literature reveals a large body of experimental evidence supporting the concept that the human visual system performs a two-dimensional harmonic analysis of visual stimuli. It also reveals a smaller body of evidence that seems to contradict this concept. Experiments performed propose a resolution of these apparent contradictions, and show how existing concepts must be slightly modified to include changes in the kind of harmonic analysis performed. Three kinds of analysis, representing increasingly fine spatial-frequency resolution, seem to quantify human performance at many form-perception tasks; the kind of analysis performed depends on the task. A single plot showing the masking effect of one spatial frequency on another promises great utility in target acquisition and detection studies camouflage designs, and designs for optimal man/machine interfaces. (Modified author abstract) GRA

N75-12613# Michigan Univ., Ann Arbor. Human Performance Center.

HUMAN INFORMATION PROCESSING: AN ASSESSMENT AND RESEARCH BATTERY

Andrew Murray Rose Jan. 1974 131 p refs
(Contract F44620-72-C-0019; AF Proj. 9778; AF Proj. 6813)
(AD-785411; TR-48; AFOSR-74-1372TR) Avail: NTIS CSCL 05/10

The paper is concerned with human information processing capacities and limitations. The goal of the effort is the establishment of a test battery that can be used to evaluate performance in a wide variety of situations, and that can provide information concerning basic processing capacities. The basic strategy was to select experimental or research paradigms that have firm theoretical and empirical bases. Selected tasks were adapted to feasible formats and four small-scale experiments were performed to refine the paradigms of selected tasks. A final battery was then assembled, and a large-scale validation experiment was performed. (Modified author abstract) GRA

N75-12614# Illinois Univ., Savoy. Aviation Research Lab.
APPLICATION OF RESPONSE SURFACE METHODOLOGY TO SHAPE DISCRIMINATION

Lawrence A. Scanlan Feb. 1974 45 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-785387; ARL-74-2/AFOSR-74-1; AFOSR-74-1445TR)
Avail: NTIS CSCL 09/2

The effects of systematically manipulating five physical features of random, closed figures were determined. Subjects were asked to select one of four figures presented as being least like the others. The five features investigated were: number of edges, area, radial length variance, edge length variance, and orientation of the major axis. A five-factor, five-level, central-composite response surface design was employed. The resulting regression equation indicated that four features were reliable in their prediction of performance. Additionally several interaction effects were found. The applicability of these data for computer simulation is discussed. Author (GRA)

N75-12615# California Univ., Berkeley. Inst. of Industrial Relations.

INDIVIDUAL DIFFERENCES IN AN ORGANIZATIONAL SETTING: INTERRELATIONSHIPS AND INFLUENCES

Milton R. Blood, Skip Lima, and John R. Kestell Aug. 1974 94 p refs
(Contract N00014-69-A-0200-1054; NR Proj. 177-941)
(AD-785003; TR-7) Avail: NTIS CSCL 05/10

A series of investigations has examined the interrelationships of individual-difference variables in an organizational setting. Work-reward preferences are treated as the focal variables for the studies. A discussion is presented which examines the appropriateness of within-person and between-person prediction models in the motivation domain. Author

N75-12616* National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
ORTHOTIC ARM JOINT Patent

Dan H. Dane, inventor (to NASA) Issued 19 Nov. 1974 7 p
Filed 4 Oct. 1973

(NASA-Case-MFS-21611-1; US-Patent-3,849,668;
US-Patent-Appl-SN-403694; US-Patent-Class-307-149;
US-Patent-Class-214-1CM; US-Patent-Class-308-174) Avail:
US Patent Office CSCL 05H

An improved orthopedic (orthotic) arm joint that can be used in various joint of mechanical arms is described. The arm joints includes a worm, which is coupled to an electric motor for rotating a worm gear carried within a rotatable housing. The worm gear is supported on a thrust bearing and the rotatable housing is supported on a radial thrust bearing. A bolt extends through the housing, bearings, and worm gear for securing the device together. A potentiometer extends through the bolt, and is coupled to the rotatable housing for rotating therewith, so as to produce an electrical signal indicating the angular position of the rotatable housing. Official Gazette of the U.S. Patent Office

N75-12617# Massachusetts Inst. of Tech., Cambridge.
Man-Vehicle Lab.

INVESTIGATION OF PILOT'S ROLE AND DISPLAY REQUIREMENTS IN AUTOMATIC LANDINGS Progress Report, 1 Sep. 1973 - 31 Aug. 1974

Renwick E. Curry 31 Aug. 1974 66 p refs
(Grant NGR-22-009-735)

(NASA-CR-140844) Avail: NTIS HC \$4.25 CSCL 05H

Two experimental capabilities were developed on the PDP-12 computers. The first of these was an experimental monitor to perform experiments in the psychophysics of visual target motion prediction, discrimination, etc., and exercises the (limited) graphical capabilities of the PDP-12. The original monitor was modified to include the capability of handling more than 64 stimuli without reinitializing the program. The second experimental monitor was programmed and was used to investigate pilot decisions in low visibility approaches. The details of this experimental capability, which has great potential for exploring decisions and behavior, are described in detail. Author

N75-12618# General Electric Co., Houston, Tex.
QUALIFICATION TEST REPORT BUMP PROTECTION HAT (SUBASSEMBLY OF T020/M509 HEAD PROTECTIVE ASSEMBLY)

D. B. Willis 5 Dec. 1972 39 p
(Contract NAS9-11905)
(NASA-CR-140347; QTR-72-1039) Avail: NTIS HC\$3.75 CSCL 06Q

The bump protection hat (BPH) was subjected to impact testing in which it underwent three impacts at 35 foot-pounds of energy. The impacts generated stress cracks, but no penetration. All impacts resulted in deflections of less than one-half inch. It was shown that the BPH is qualified for Skylab and the rescue vehicle. Author

N75-12619# Southwest Research Inst., San Antonio, Tex.
UNITED STATES NAVY PHYSIOLOGICAL TELEMETRY SYSTEM OPERATION AND MAINTENANCE MANUAL Final Report, 10 Nov. 1972 - 12 Sep. 1974

Robert L. Wilbur 12 Sep. 1974 31 p
(Contract N00014-73-C-0206; SwRI Proj. 13-3601)
(AD-785273) Avail: NTIS CSCL 06/2

A single channel, 2 pound, belt worn telemetry system that conveys heart rate and core temperature information up to at least a mile without loss of signal integrity and accuracy is described. The system includes two single channel transmitters (Motorola HT-220 Handie-Talkie), a Receiver Station containing two matching receivers, two office type cassette recorders, and signal conditioning to provide data storage and direct digital readout of core temperature and heart rate on two remotely located test subjects. The Receiver Station is portable, powered by a 12 volt automobile battery and is designed to be operated by field personnel with little or no medical training. (Modified author abstract) GRA

N75-12620# Illinois Univ., Savoy. Aviation Research Lab.
MAN AS A PRECIOUS RESOURCE: THE ENHANCEMENT

OF HUMAN EFFECTIVENESS IN AIR TRANSPORT OPERATIONS Interim Report

Stanley N. Roscoe May 1974 25 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-785368; ARL-74-6/AFOSR-74-4; AFOSR-74-1446TR)
Avail: NTIS CSCL 05/8

All aviation systems of practical interest include both men and machines, and aviation psychology is the scientific study of human behavior in the operation of aviation systems. The enhancement of human effectiveness in flight operations involves the complementary processes of behavioral engineering and the selection and training of personnel. Behavioral engineering refers to the intentional effort to design equipment, organize system elements, and develop operational procedures to maximize system performance while minimizing the need to select and train personnel. Selection and training of flight crews and controllers maximize system performance within limits inherent to the system as designed. Specific research topics are reviewed. (Modified author abstract) GRA

N75-12621*# Army Natick Labs., Mass. Food Lab.

NON-CAKING FREEZE DRIED APPLESAUCE

Abdul R. Rahman, Thomas R. Schmidt, Edward E. Anderson, David S. Criz, and Karl R. Johnson Mar. 1974 21 p refs
(NASA Order T-20541-G; DA Proj. 1G7-62713-A-034)
(NASA-CR-140938; AD-779456; FL-190;
USA-NLABS-TR-74-37-FL) Avail: NTIS HC \$3.25 CSCL 06H

A study was initiated to develop an applesauce which resists caking when subjected to elevated temperatures such as 37.7 C for two weeks and/or 57 C for three hours as required by NASA. Juice was extracted from McIntosh apples at different levels ranging between 15.8% and 77.0% by weight. The following results were obtained: (1) the degree of caking of the freeze dried applesauce powder was correlated with the amount of juice extracted; (2) correlations were established between the percentage of juice extracted and each of the following: bulk density; soluble solids; and reducing sugars of the applesauce powders; and (3) reducing sugars appear to be the factor contributing most significantly to the caking with the higher reducing sugar levels producing the higher degrees of caking.

Author

N75-12622*# Minnesota Univ., Minneapolis. Div. of Environmental Health.

ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE Progress Report, 1 Dec. 1972 - 31 May 1973

Irving J. Pflug 31 May 1973 44 p
(Grant NGL-24-005-160)
(NASA-CR-140941) Avail: NTIS HC \$3.75 CSCL 06M

The mechanistic basis of the synergetic effect of combined heat and radiation on microbial destruction was analyzed and results show that radiation intensity, temperature, and relative humidity are the determining factors. Dry heat resistance evaluation for selected bacterial spore crops indicates that different strains of *Bacillus stearothermophilus* demonstrate marked differences in resistance. Preliminary work to determine the effects of storage time, suspending medium, storage temperature and spore crop cleaning procedures on dry heat survival characteristics of *Bacillus subtilis* var. *Niger*, and dry heat resistance of natural microflora in soil particles is also reported.

G.G.

N75-13502* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AUTOMATIC INOCULATING APPARATUS Patent

Judd R. Wilkins and Stacey M. Mills, inventors (to NASA) Issued 26 Nov. 1974 10 p Filed 24 Jan. 1973

(NASA-Case-LAR-11074-1; US-Patent-3,850,754;
US-Patent-Appl-SN-326364; US-Patent-Class-195-127-;

US-Patent-Class-195-120; US-Patent-Class-115-103.5) Avail: US Patent Office CSCL 06B

An automatic inoculating apparatus for agar trays is described and using a simple inoculating element, such as a cotton swab or inoculating loop. The apparatus includes a movable carriage for supporting the tray to be inoculated, a drive motor for moving the tray along a trackway, and a swabbing motor for automatically swabbing the tray during the movement. An actuator motor controls lowering of the inoculating element onto the tray and lifting of the inoculating element. An electrical control system, including limit microswitches, enables automatic control of the actuator motor and return of the carriage to the initial position after inoculating is completed.

Official Gazette of the U.S. Patent Office

N75-13503*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BESMEX: BERING SEA MARINE MAMMAL EXPERIMENT

G. Carleton Ray and Douglas Wartzok Oct. 1974 55 p refs
Prepared in cooperation with Johns Hopkins Univ. Original contains color illustrations
(NASA-TM-X-62399) Avail: NTIS HC \$4.25 CSCL 06C

Predictive ecological models are being studied for the management and conservation of the walrus, and the bowhead whale in the Bering Sea. The influence of sea ice on the distribution, and carrying capacity of the area for these two mammals is to be investigated with the primary target species being the walrus. Remote sensing and radio tracking is considered a requirement for assessing the walrus ecosystem. F.O.S.

N75-13504*# General Electric Co., Philadelphia, Pa. Space Div.

AUTOMATED BIOWASTE SAMPLING SYSTEM IMPROVED FECES COLLECTION, MASS MEASUREMENT AND SAMPLING Final Report

G. L. Fogal, J. K. Mangialardi, and R. Young Sep. 1974 150 p
(Contract NAS1-11443)

(NASA-CR-140376; DOC-74SD4248) Avail: NTIS HC \$5.75 CSCL 06I

The capability of the basic automated Biowaste Sampling System (ABSS) hardware was extended and improved through the design, fabrication and test of breadboard hardware. A preliminary system design effort established the feasibility of integrating the breadboard concepts into the ABSS. Author

N75-13505*# General Electric Co., Philadelphia, Pa. Space Div.

AUTOMATED BIOWASTE SAMPLING SYSTEM, SOLIDS SUBSYSTEM OPERATING MODEL, PART 2 Final Report

G. L. Fogal, J. K. Mangialardi, and R. E. Stauffer Nov. 1973 148 p
(Contract NAS1-11443)

(NASA-CR-140378; DOC-74SD4208-Pt-2) Avail: NTIS HC \$5.75 CSCL 06I

The detail design and fabrication of the Solids Subsystem were implemented. The system's capacity for the collection, storage or sampling of feces and vomitus from six subjects was tested and verified. N.R.

N75-13506*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

WATER PURIFICATION PROCESS Patent Application

John R. Hollahan and Theodore Wydeven, inventors (to NASA) Filed 6 Nov. 1974 15 p
(NASA-Case-ARC-10643-2; US-Patent-Appl-SN-521619) Avail: NTIS HC \$3.25 CSCL 06I

A reverse osmosis process for the purification of water is presented wherein a saline solution is placed under pressure against a polymeric membrane supported by a microporous inert support. Salt and other impurities collect on one side of the membrane and purified water on the other. The membrane is made by a process wherein an allyl amine or similar compound

is polymerized as a thin film in the presence of a plasma discharge. These films showed outstanding properties as reverse osmosis membranes. The membranes are formed essentially in the absence of air under conditions where few, if any, defects are produced. The most outstanding feature of the membranes is that they can be stored under ordinary ambient, dry conditions. NASA

N75-13507*# Kanner (Leo) Associates, Redwood City, Calif.
BACTERIAL CONTAMINATION OF INDOOR AIR AS A FUNCTION OF AIR EXCHANGE

H. J. Russenberger and H. U. Wanner Washington NASA Dec. 1974 7 p Transl. into ENGLISH from Zentrabl. Bakteriöl. Parasitenk., Abt. 1 Orig. (East Germany), A 227, 1974 p 564-567

(Contract NASw-2481)

(NASA-TT-F-16084) Avail: NTIS HC \$3.25 CSCL 06M

Airborne bacteria counts were taken in operating rooms with natural ventilation and with ventilation systems producing hourly air exchange rates of 12x and 20x; the average counts were about 700, 300 and 60 bacteria/cu m, respectively. An operating cubicle with a low-turbulence displacement system produced a zero bacteria count. Tests in a climate chamber with a variable air exchange rate showed an appreciable reduction in bacteria count resulting when air exchange rate was increased to 25 1/h.

Author

N75-13508*# Georgetown Univ., Washington, D.C. Dept. of Biology.

DIFFERENTIAL ELECTROPHORETIC SEPARATION OF CELLS AND ITS EFFECT ON CELL VIABILITY Final Report

Esther M. Leise and Frances Lesane Dec. 1974 20 p refs (Contract NAS8-29778)

(NASA-CR-120553) Avail: NTIS HC \$3.25 CSCL 06M

An electrophoretic separation method was applied to the separation of cells. To determine the efficiency of the separation, it was necessary to apply existing methodology and develop new methods to assess the characteristics and functions of the separated subpopulations. Through appropriate application of the widely used isoelectric focusing procedure, a reproducible separation method was developed. Cells accumulated at defined pH and 70-80% remained viable. The cells were suitable for further biologic, biochemical and immunologic studies. Author

N75-13509*# Research Triangle Inst., Research Triangle Park, N.C.

APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Final Report, Sep. 1973 - Aug. 1974

J. N. Brown Aug. 1974 94 p

(Contract NASw-2459)

(NASA-CR-141113) Avail: NTIS HC \$4.75 CSCL 06B

The results of the medically related activities of the NASA Application Team Program at the Research Triangle Institute are presented. The RTI team, a multidisciplinary team of scientists and engineers, acted as an information and technology interface between NASA and individuals, institutions, and agencies involved in biomedical research and clinical medicine. The Team has identified 40 new problems for investigation, has accomplished 7 technology applications, 6 potential technology application, 4 ir.pacts, has closed 54 old problems, and has a total of 47 problems under active investigation.

Author

N75-13510 Michigan Univ., Ann Arbor.
A DISCRETE-PARAMETER HEAD INJURY MODEL Ph.D. Thesis

Nabih Mohammed Alem 1974 204 p

Avail: Univ. Microfilms, Order No. 74-25132

The mechanics of head injury and some current techniques and models for its assessment, under limited impact conditions, are discussed. Based on the hypothesis that injury results from a combination of displacement and rotation of the brain inside the skull, a head injury model is proposed. The model is a 12-degree-of-freedom mechanical system consisting of masses,

dashpots and springs. The classical Lagrange's method is used in formulating the equations of motion. The solution is obtained by numerical integration. The frequency- and time-responses of the model, for a variety of loading conditions, are studied. Results show a good agreement between experimentally observed and mathematically generated responses.

Dissert. Abstr.

N75-13511# Istituto Superiore di Sanita, Rome (Italy).

HEALTH ASPECTS OF RADIO-FREQUENCY ELECTROMAGNETIC RADIATION

M. Grandolfo 3 Apr. 1974 31 p refs In ITALIAN; ENGLISH summary

(ISS-L-74/3) Avail: NTIS HC \$3.75

Many of the nonionizing electromagnetic radiation at certain frequencies, power levels, and exposure durations can produce biological effects or injury depending on multiple physical and biological variables. The pathophysiology is reviewed of exposure to microwaves and radio frequency radiation, and the protection guides which have been established for these waves in many countries and organizations.

Author

N75-13512*# Kanner (Leo) Associates, Redwood City, Calif.
RESEARCH ON COLD STERILIZATION WITH FORMALIN VAPORS

W. Adam Washington NASA Dec. 1974 10 p refs Transl. into ENGLISH from Zentrabl. Bakteriöl. Parasitenk., Abt. 1 Orig. (East Germany), A 227, 1974 p 477-481

(Contract NASw-2481)

(NASA-TT-F-16085) Avail: NTIS HC \$3.25 CSCL 06E

The sterilization efficacy of formalin vaporized in a 20 liter sterilizer operated at 70 F is compared with that of ethylene oxide, using spores of *B. subtilis*. Neither produces good results with tap water with spore counts higher than 100. The two agents are roughly equivalent in killing spores in alcohol/blood specimens; formalin is superior for spores in physiological saline. Spores in cloth pads saturated with blood and dried are shown to be more resistant to formalin. The latter test is recommended for formalin sterilization apparatus.

Author

N75-13513*# Kanner (Leo) Associates, Redwood City, Calif.
NAD- AND NADP-DEPENDENT DEHYDROGENASE ACTIVITIES IN ERYTHROCYTES UNDER EXPERIMENTAL HYPOXIA

M. M. Epshteyn, V. A. Nikonova, Z. I. Spilioti, and N. B. Kakhnov Washington NASA Dec. 1974 8 p refs Transl. into ENGLISH from Ukr. Biokhim. Zh. (Kiev), v. 46, no. 5, Sep.-Oct. 1974 p 564-567

(Contract NASw-2481)

(NASA-TT-F-16095) Avail: NTIS HC \$3.25 CSCL 06E

The activity of some NAD- and NADP-dependent enzymes in rat erythrocytes was studied under hypoxic hypoxia and adrenal myocarditis. It is shown that under acute hypoxic hypoxia the activity of glucose-6-phosphate-dehydrogenase in a nucleus free erythrocyte is inhibited reversibly, the glutathione reductase activity immediately connected with the former being unchanged. The activity of lactate dehydrogenase increased. Under a considerable dose of adrenalin, the activity of glutathione reductase rose. Thus, under acute hypoxia, the ratio between the aerobic and anaerobic pathways of energy formation in the erythrocyte is disturbed in favor of the anaerobic pathway.

Author

N75-13514*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF HYPEROXIA ON HEMOGLOBIN, SERUM PROTEIN AND GAS METABOLISM IN ADRENALECTOMIZED RATS

V. P. Dudarev Washington NASA Dec. 1974 10 p refs Transl. into ENGLISH from Patol. Fiziöl. i Eksperim. Terapiya (Moscow), no. 3, May-Jun. 1974 p 39-43

(Contract NASw-2481)

(NASA-TT-F-16094) Avail: NTIS HC \$3.25 CSCL 06E

Increased oxygen pressure (1, 2 and 3 gage atm) for 15 to 17 days, one hour each day, caused statistically unreliable shifts in erythrocyte and hemoglobin content in intact rats, whereas a 16.3% decrease in peripheral blood erythrocyte content and a 14.8% decrease in hemoglobin were observed in adrenalectomized

rats. Both increased oxygen pressure and adrenalectomy tended to decrease hemoglobin I, II, III and IV fraction content. In adrenalectomized rats, fraction III rose only during 1 and 2 gage atm. Both adrenalectomized and intact rats developed dysproteinemia during adaptation to hyperoxia. Author

**N75-13515*# Kanner (Leo) Associates, Redwood City, Calif.
THE EFFECT OF CAFFEINE UPON BLOOD GLUCOSE LEVEL**

J. Hankiewicz Washington NASA Dec. 1974 12 p refs
Transl. into ENGLISH from Pol. Tyg. Lek. (Poland), v. 15, 1960 p 742-745

(Contract NASw-2481)

(NASA-TT-F-16049) Avail: NTIS HC \$3.25 CSCL 06E

Caffeine, administered by different routes to normal and diabetic patients in 0.07 to 0.16 g doses, decreased blood glucose by 11.6 and 13.3 mg-%, respectively, after 30 to 5 min for parenteral or 45 to 50 min for oral administration. The effect was proportional to the dosage and was the greater the higher the initial hyperglycemia. Author

**N75-13516# Defence and Civil Inst. of Environmental Medicine,
Downsview (Ontario).**

ENERGY EXPENDITURE OF INFANTRY PATROLS DURING AN ARCTIC WINTER EXERCISE

C. L. Allen and W. J. OHara Dec. 1973 9 p

(DCIEM-73-R-985) Avail: NTIS HC \$3.25

The energy expenditure of infantry troops participating in winter training exercises at Churchill and Frobisher Bay, Canada were monitored. Twenty-seven personnel comprising three tent groups were studied as they carried out the normal tasks of living in tents and moving on foot. Mechanical transport and laboratory facilities were available at Churchill where, direct measurements with the Kofranyi-Michaelis respirometer were obtained as the personnel carried out their training assignments including cross country patrols up to 6000 metres a day. Close observation and diaries were used to assess the energy expenditures of the same personnel at Frobisher Bay. A gross energy cost of 3484 Kcal per man per day was calculated from these data. The ration provided 3600 Kcal, enough to maintain caloric balance although there were significant changes in body composition. Author

**N75-13517# Defence and Civil Inst. of Environmental Medicine,
Downsview (Ontario).**

PHYSICAL FITNESS AND TOLERANCE TO ENVIRONMENTAL STRESSES: A REVIEW OF HUMAN RESEARCH ON TOLERANCE TO AND WORK CAPACITY IN HOT, COLD AND HIGH ALTITUDE ENVIRONMENTS

W. S. Myles and A. K. Chin Feb. 1974 17 p refs

(DCIEM-74-R-1008) Avail: NTIS HC \$3.25

The relation between physical fitness and tolerance to heat, cold, and high altitude was examined and it was found that work-heat tolerance for periods of two hours or less in both dry and humid heat is increased by physical conditioning; the benefits are less obvious for longer exposures. Field and laboratory studies clearly indicate that physical fitness is not a complete substitute for acclimatization. It seems possible that fit individuals acclimatize more readily and safely to heat. Physical conditioning opposes one effect of altitude which is to decrease maximum aerobic power, but physically fit individuals do not appear to be any less susceptible to acute mountain sickness. Cold tolerance is commonly assessed in nude subjects and the evidence is conflicting concerning the benefits of physical conditioning. On balance, however, it does not appear that the thermoregulatory response to cold is improved by superior physical fitness. Evidence is lacking which is pertinent to the realistic situation where a man is fully clothed at work and at rest in the cold. Author

**N75-13518*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 25: DECOMPRESSION DISORDERS**

P. M. Gramenitskiy Washington NASA Dec. 1974 356 p refs
Transl. into ENGLISH from the monograph "Problemy Kosmicheskoy Biologii. Tom Dekompressionnyye Rasstroystva"

Moscow, Nauka Press, 1974 349 p

(Contract NASw-2481)

(NASA-TT-F-15970) Avail: NTIS HC \$10.00 CSCL 06E

The monograph describes the problems of decompression disorders: The functional disturbances arising in the organism as the result of the formation of gas bubbles in the blood and tissues incident to decompression. The author and his colleagues present experimental data gathered in the course of many years of systematic study of why and how decompression disorders develop in man and animals after a stay under increased pressure or upon transition to a rarefied atmosphere. The general principles governing the development of decompression disturbances and the role of aeroembolism in their pathogenesis, are expressed. The existence in the organism of defense reactions against aeroembolism is established, as well as the possibility of enhancing the organism's resistance to decompression effects. Conclusions of value to deep-sea diving and to the caisson method of construction work under water are inserted, as well as experimental data on how to ensure decompression disorder prophylaxis on space flights. Author

**N75-13519# Civil Aeromedical Inst., Oklahoma City, Okla.
Medical Statistical Section.**

CHARACTERISTICS OF MEDICALLY DISQUALIFIED AIRMAN APPLICANTS DURING CALENDAR YEAR 1971

Charles F. Booze, Jr. May 1974 18 p refs

(AD-781648; FAA-AM-74-5) Avail: NTIS HC \$3.00

Medical and general descriptive characteristics of airmen medically disqualified are quantified. Descriptive data concerning age, sex, occupation, class of medical certificate applied for, cause-specific denial rates, and total flying time for medically disqualified applicants are presented. The overall denial rate was 9.5 per 1000 applicants. Higher age intervals contributed more to denials than would be expected. Eighty-seven percent of all denied applicants were not occupationally connected to aviation. Fifty-seven percent had less than 40 hours total flight experience. Cardiovascular, neuropsychiatric, and miscellaneous pathology were the most significant causes for denial. Author

**N75-13520# Civil Aeromedical Inst., Oklahoma City, Okla.
AMPLITUDE/FREQUENCY DIFFERENCES IN A SUPINE RESTING SINGLE LEAD ELECTROCARDIOGRAM OF NORMAL VERSUS CORONARY HEART DISEASED MALES**

Michael T. Lategola and Peter J. Layne (MarDen Enterprises, Las Cruces, N. Mex.) May 1974 33 p refs

(AD-781685; FAA-AM-74-6) Avail: NTIS HC \$3.25

Research aimed at improved screening detection of CHD evaluated amplitude/frequency analysis of high fidelity ECG recordings. Thirty normal males and 30 with documented CHD were selected. Analog ECGs were obtained using electromagnetic tape recording. Two bipolar leads were recorded during supine rest. An analysis system provided for digital conversion, division of whole electrocardiac cycles into four defined segments, time-normalization of each segment, and amplitude/frequency analysis. The results from the CM sub 5 lead recorded at supine rest are presented. Comparison of the normal versus CHD groups across the 30-subject average amplitude values for each of 200 harmonics per segment revealed significant differences at most of the 200 harmonics. Two criteria, based only on the maximum and minimum amplitude values for each of the 200 harmonics, succeeded in individual screening separation of the normal CHD males. Author

**N75-13521# Civil Aeromedical Inst., Oklahoma City, Okla.
EFFECTS OF SECobarbital AND D-AMPHETAMINE ON TRACKING PERFORMANCE DURING ANGULAR ACCELERATION**

David J. Schroeder, William E. Collins, and Gary W. Elam (Oklahoma Univ., Oklahoma City) Dec. 1973 12 p refs

(AD-777582; FAA-AM-73-17) Avail: NTIS HC \$3.00

Thirty young men were randomly assigned in equal numbers to one of the following groups: placebo secobarbital (100 mg), or d-amphetamine (10 mg). The drugs or placebo were administered in capsules in a double-blind procedure

following practice at a tracking task and baseline determinations of tracking performance levels in both static (stationary) and dynamic (angular acceleration) conditions. With the rotator stationary, d-amphetamine subjects performed significantly better than controls. However, during angular acceleration, secobarbital subjects made significantly more tracking errors and had significantly more vestibular nystagmus than both the control and the d-amphetamine groups for all postdrug sessions. These findings agree with our previous studies of alcohol effects: depressant drugs may have little or no deleterious influence on tracking performance in static environments, but may produce marked performance degradation during angular motion. Author

N75-13522# Massachusetts Inst. of Tech., Cambridge, Man-Vehicle Lab.

SIMULATOR EVALUATION OF PILOT ASSURANCE DERIVED FROM AN AIRBORNE TRAFFIC SITUATION DISPLAY. PHASE 2: TRAFFIC AWARENESS IMPROVEMENT Final Project Report, 1 Mar. 1972 - 30 Jun. 1973 David Melanson Jul. 1973 241 p refs (Contracts DOT-FA71WAI-234; Contract F19628-70-C0230) (AD-778951; FAA-EM-74-10) Avail: NTIS HC \$6.00

Forty-four professional pilots participated in a number of simulation experiments designed to measure pilot awareness using today's partly line voice communications and a possible future system employing the ATSD. Tests were run with and without an in-trail spacing task and with one and two-man flight crews. In addition, a pilot's ability to detect and react to conflict situations was measured during both single and parallel runway operations. The effects of conflict alarms and the frequency of updating information were also examined. All Experiments were conducted in a fixed-based simulator configured as a Boeing 707. The ATSD was found to be superior to the party-line communication channel as a source of traffic awareness. With no spacing task, the detection of conflicts prior to the point of closest approach occurred in all cases employing the ATSD regardless of whether an alarm was used or whether a crew or single pilot was being tested. With a spacing task, a high percentage of the conflicts were detected by single pilots, but not always in time to take safe evasive action, particularly during closely-spaced parallel approaches. Tau (range divided by range rate) alarms reduce the reaction time of both crews and single pilots in responding to conflicts in some, but not all, conflicts. Author

N75-13523*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

A MODEL AND PREDICTIVE SCALE OF PASSENGER RIDE DISCOMFORT

Thomas K. Dempsey Dec. 1974 30 p refs (NASA-TM-X-72623) Avail: NTIS HC \$3.75 CSCL 05E

A model to define the interrelationship of the various factors (vibratory and nonvibratory) important to passenger comfort, in realistic transport vehicle vibration environments was developed. The model represents: (1) a framework for the investigation of comfort within diverse transportation vehicles; (2) a mechanism for the development of a scale of comfort; (3) a mechanism through which design criteria can be obtained for improving the rideability of current and future transportation vehicles; and (4) a tool for obtaining information for the maximization of passenger ride quality, based upon sociological and psychological information. The application of the model is based upon the computational steps necessary for derivation of the comfort scale. The emphasis within the scale is upon the summation of comfort units; the summation being obtained through the use of appropriately determined factors, both within and between axes. Author

N75-13524*# Scientific Translation Service, Santa Barbara, Calif. **THE CENTRAL AND PERIPHERAL VISUAL ACUITY OF THE LIGHT-ADAPTED AND DARK-ADAPTED EYE**

E. W. Katzenellenbogen Washington NASA Dec. 1974 28 p refs Transl. into ENGLISH from Psychologische Studien (Leipzig), v. 3, 1907 p 272-293

(Contract NASw-2483)

(NASA-TT-F-16068) Avail: NTIS HC \$3.75 CSCL 05E

Light adapted vision is sharper and fatigues less. The effect of peripheral angles of vision is determined. Author

N75-13525# Militaerpsykologiska Institutet, Stockholm (Sweden).

JUDGEMENT OF DISTANCE OVER GROUND AND IN PHOTOGRAPHS [BEDOEMNING AV AVSTAND I TERRAENG OCH PA FOTO ETT FOERFOERSOEK]

Henry Widen Nov. 1972 24 p refs In DANISH (B-80) Avail: NTIS HC \$3.25

A laboratory technique was studied for visuo-spatial judgments where terrain effects can be considered. Twelve persons made judgements of 18 different distances over ground, the distances ranging from 55 to 1850 meters. The objects to be judged were photographed and the same 12 persons made binocular judgments with the area of vision restricted to projected photographs where the visual angles of the objects to be judged were the same as in the out door task. The results show a correlation of .75 between judgments under the two conditions and larger error of judgment in photograph judgments in the shortest and the longest distances. The lack of agreement in the shorter distances is probably due to the fact that binocular stereopsis was effective in judgments over ground but not in the photographs, whereas the cause in the longest distances probably is the poor resolution of the photographs relative to the resolution capacity of the eye. Author

N75-13526# Civil Aeromedical Inst., Oklahoma City, Okla.

JOB-RELATED ATTITUDES OF NON-JOURNEYMAN FAA AIR TRAFFIC CONTROLLERS AND FORMER CONTROLLERS: A SEX COMPARISON

John J. Mathews, William E. Collins, and Bart B. Cobb Aug. 1974 26 p refs

(AD-787238; FAA-AM-74-7) Avail: NTIS HC \$3.25

Recent Air Traffic Control (ATC) attrition rates showed no sex differences in the proportion of trainees completing FAA Academy training; however, the percentage of women who subsequently left ATC work was twice that of men. Questionnaires concerning aspects of job-related attitudes were given to 56 males and 56 females former trainees (attritions) who were matched on several variables, and also to a sample of controllers (63 women and 63 matched men) who entered training at the same time as the attritions, but who were still in ATC work (retentions). Over half the attritions and less than a third of the retentions thought training was too hurried and not adequate. Among women, more attritions (38%) than retentions (18%) felt shift work was not desirable. About one-third of male attritions but less than one-sixth of male retentions viewed the work as routine and not pleasant. Author

N75-13527# Civil Aeromedical Inst., Oklahoma City, Okla.

PERSONALITY AND PHYSIOLOGICAL CORRELATES OF PERFORMANCE DECREMENT ON A MONOTONOUS TASK REQUIRING SUSTAINED ATTENTION

Richard I. Thackray and Robert M. Touchstone Dec. 1973 18 p refs

(AD-777825; FAA-AM-73-14) Avail: NTIS HC \$3.00

A serial reaction task was used to study possible personality, as well as physiological, correlates of individual differences in performance decrement under low task load conditions. Sixty subjects performed the task continuously for 40 minutes. Extraverted subjects showed increasing lapses of attention, while introverted subjects failed to show any evidence of a decline in attention. Of the two extraversion components (impulsivity and sociability), impulsivity was the component responsible for the obtained decrement. Heart rate variability showed a significant relationship with performance decrement while mean heart rate did not. Author

N75-13528# Civil Aeromedical Inst., Oklahoma City, Okla.

SUSCEPTIBILITY TO ANXIETY AND SHIFT DIFFICULTY AS DETERMINANTS OF STATE ANXIETY IN AIR TRAFFIC CONTROLLERS

Roger C. Smith and C. E. Melton, Jr. Dec. 1973 6 p refs

(AD-777565; FAA-AM-73-15) Avail: NTIS HC \$3.00

The State-Trait Anxiety Inventory (STAI) was used to assess the anxiety of air traffic controllers who had experienced difficult and easy work shifts. Eighty volunteers completed the STAI before and after two or more eight-hour work shifts. Controllers relatively

high in anxiety proneness tended to report higher levels of anxiety in association with control work than those relatively low in anxiety proneness. The mean A-state score after shifts was higher than the mean score before shifts. It was also determined that the increase in anxiety during shifts was greater for difficult shifts. Author

N75-13529# Civil Aeromedical Inst., Oklahoma City, Okla.
UTILITY OF SEVERAL CLINICAL TESTS OF COLOR DEFECTIVE VISION IN PREDICTING DAYTIME AND NIGHTTIME PERFORMANCE WITH THE AVIATION SIGNAL LIGHT GUN

Jo Ann Steen, William E. Collins, and Mark F. Lewis Dec. 1973 19 p refs

(AD-777563; FAA-AM-73-18) Avail: NTIS HC \$3.00

Subjects of varying type and degree of color deficiency were tested on a battery of color tests. Correlations with a daytime and nighttime practical test of the ability of subjects to discriminate aviation signal red, white, and green were obtained. The results indicate that color defective people can identify flashes from a signal light gun better at night than during the day. It was also found that the Farnsworth Lantern, the SAM Color Threshold Tester, the two sets of A O Plates, and the Dvorine Plates were among the best predictors of performance on the practical test. Author

N75-13530# Human Engineering Labs., Aberdeen Proving Ground, Md.

LACK OF APPETITIVE AROUSAL EFFECTS ON SENSORY PROCESSING OF AUDITORY EVOKED POTENTIALS Final Report

Lynn C. Oatman Jun. 1974 32 p refs

(AD-785541; HEL-TM-12-74) Avail: NTIS CSCL 05/10

The purpose of the present report is to investigate the selective processes within the central nervous system where relevant sensory information is perceived while irrelevant information is rejected. Three experiments were conducted to examine whether irrelevant auditory information is rejected in the unanesthetized cat, with middle-ear muscles cut, during food deprivation. Since food deprivation can produce a state of heightened EEG arousal, this increased arousal can result in the activation of the inhibitory mechanisms and produce attenuation of click-evoked potentials in the auditory pathways. The results consistently show that increased food deprivation had no significant arousal effects or changes in the click-evoked responses recorded along the auditory pathway. Author (GRA)

N75-13531* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CIRCUIT FOR DETECTING INITIAL SYSTOLE AND DICROTIC NOTCH Patent

Vernon D. Gebben and John A. Webb, Jr., inventors (to NASA) Issued 26 Nov. 1974 7 p Filed 30 Jan. 1973 Supersedes N73-18139 (11 - 09, p 0997)

(NASA-Case-LEW-11581-1; US-Patent-3,850,169;

US-Patent-Appl-SN-327921; US-Patent-Class-128-2.05P;

US-Patent-Class-128-2.05A) Avail: US Patent Office CSCL 06B

Circuitry is disclosed for processing an arterial pressure waveform to produce during any one cycle a pulse corresponding to the initial systole and a pulse corresponding to the dicrotic notch. In a first channel, an electrical analog of the arterial pressure waveform is filtered and then compared to the original waveform to produce an initial systole signal. In a second channel, the analog is differentiated, filtered, and fed through a gate controlled by pulses from the first channel to produce an electrical pulse corresponding to the dicrotic notch.

Official Gazette of the U.S. Patent Office

N75-13532# Connecticut Univ., Storrs. Dept. of Pathobiology.

STUDIES ON DISEASE TRANSMISSION IN SPACECRAFT ENVIRONMENTS Final Report

Alan J. Kenyon Oct. 1974 145 p Original contains color illustrations

(Contract NAS9-11941)

(NASA-CR-140372) Avail: NTIS HC \$5.75 CSCL 06E

The effects of the Skylab gas mixtures on general health and immunocompetence of mice and ferrets subjected to the Skylab space cabin environment (SCE) were initially studied in a stainless steel low pressure facility which was maintained at gas ratios of 30% nitrogen and 70% oxygen under 5 psia, and which consisted of two subchambers, that permitted mutual isolation of experimental groups and/or selective removal of animals without return of the entire cabin to ambient pressure was developed. The studies demonstrated that ferrets immunized with Brucella Strain 19 prior to being housed in SCE had decreased synthesis of IgG compared to their respective controls. The possibility of latent infections being responsible for stress-induced upper respiratory diseases of astronauts required that the role of neutralizing antibody as a function of antibody affinity/avidity be investigated. The model consisted of Aleutian disease virus (ADV) which infects ferrets and mink resulting in nonneutralized immune complexes. These studies demonstrated that early antibody to ADV had lower affinity/avidity than late antibody with respect to chronicity. These studies culminated in a description of antibody affinity, first isolation of ADV and its cultivation in vitro. Author

N75-13533*# General Electric Co., Philadelphia, Pa. Space Div.

AUTOMATED BIOWASTE SAMPLING SYSTEM URINE SUBSYSTEM OPERATING MODEL, PART 1 Final Report

G. L. Fogal, J. K. Mangialardi, and F. Rosen Nov. 1973 224 p

(Contract NAS1-11443)

(NASA-CR-140377; DOC-74SD4208-Pt-1) Avail: NTIS HC \$7.25 CSCL 06I

The urine subsystem automatically provides for the collection, volume sensing, and sampling of urine from six subjects during space flight. Verification of the subsystem design was a primary objective of the current effort which was accomplished thru the detail design, fabrication, and verification testing of an operating model of the subsystem. Author

N75-13534*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SELF-CONTAINED BREATHING APPARATUS Patent Application

John L. Sullivan (Scott Aviation Corp., Lancaster, N. Y.), Eugene A. Giorgini (Scott Aviation Corp., Lancaster, N. Y.), and Milo R. Simmonds, inventors (to NASA) (Scott Aviation Corp., Lancaster, N. Y.) Filed 11 Nov. 1974 12 p

(Contract NAS9-13177)

(NASA-Case-MS-C-14733-1; NASA-Case-MS-C-14735-1;

US-Patent-Appl-SN-522971) Avail: NTIS HC \$3.25 CSCL 06K

A self-contained breathing apparatus with automatic redundant fluid pressure controls is presented along with a self-contained breathing apparatus having a facemask respirator, automatic redundant fluid pressure controls, and a fluid-actuated alarm. The automatic redundant pressure controls provide alternate lines of fluid communication in the event of failure of the primary pressure reducer or depletion of the supply of gas to a low level. A fluid-actuated alarm, located in the facemask to avoid wasteful exhausting of the gas, signals either depletion of the supply of gas or a failure closed condition of the primary reducer. NASA

N75-13535*# ILC Industries, Inc., Dover, Del.

APOLLO/SKYLAB SUIT PROGRAM-MANAGEMENT SYSTEMS STUDY, VOLUME 1

M. McNiff 30 Apr. 1974 254 p

(Contract NAS9-6100)

(NASA-CR-140368; SES-074-101-Vol-1)

Avail: NTIS HC \$8.50 CSCL 06K

A management systems study for future spacesuit programs was conducted to assess past suit program requirements and

management systems in addition to new and modified systems in order to identify the most cost effective methods for use during future spacesuit programs. The effort and its findings concerned the development and production of all hardware ranging from crew protective gear to total launch vehicles. Author

N75-13536** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

AUTOMATIC BIOWASTE SAMPLING Patent Application

G. L. Fogal (GE) and Richard L. Sauer, inventors (to NASA)

Filed 22 Nov. 1974 18 p

(Contract NAS1-11443)

(NASA-Case-MSC-14640-1; US-Patent-Appl-SN-526449) Avail: NTIS HC \$3.25 CSCL 14B

A sampling system for acquiring biowaste samples in a space craft is reported; the automatic biowaste system for sampling and disposal of feces and vomitus includes a storage container and an associated seat. The storage container has a slide valve which is releasably locked in positions placing the seat into and out of communication with the container. A passage from the seat leads to a rotating platform with peripherally located vertical tines. The rotating platform disperses waste radially. A retrievable, porous sampling strip is insertable about the periphery of the rotating platform and is retractable into a separate sampling container. The sampling strip is retrievable into a plastic storage container for subsequent analysis. NASA

N75-13537** Martin Marietta Corp., Denver, Colo.

UTILIZATION OF IMMOBILIZED UREASE FOR WASTE WATER TREATMENT Final Report

Richard R. Husted Dec. 1974 44 p refs

(Contract NAS2-8165)

(NASA-CR-137596) Avail: NTIS HC \$3.75 CSCL 06I

The feasibility of using immobilized urease for urea removal from waste water for space system applications is considered, specifically the elimination of the urea toxicity problem in a 30-day Orbiting Frog Otolith (OFO) flight experiment. Because urease catalyzes the hydrolysis of urea to ammonia and carbon dioxide, control of their concentrations within nontoxic limits was also determined. The results of this study led to the use of free urease in lieu of the immobilized urease for controlling urea concentrations. An ion exchange resin was used which reduced the NH₃ level by 94% while reducing the sodium ion concentration only 10%. Author

N75-13538# Kansas State Univ., Manhattan. Inst. for Systems Design and Optimization.

COMPUTER SIMULATION OF OPTIMAL CONTROL OF AN INTEGRATED HUMAN THERMAL SYSTEM BY RESPONSE SURFACE METHODOLOGY

C. L. Hwang, L. T. Fan, S. A. Konz, and H. N. Ozarkar Aug. 1974 78 p refs

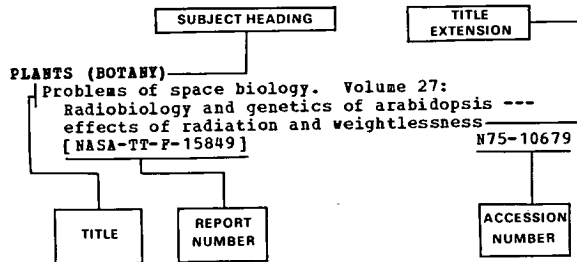
(Grant NSF GK-41206)

(PB-234660/9; ISDO-59) Avail: NTIS HC \$4.75 CSCL 06Q

The optimal policy for controlling an integrated human thermal system (the body and a watercooled garment on the head and torso) was determined by the response surface methodology. This methodology finds empirically and systematically the optimal control policy; this report, however, presents a scheme based on the method for carrying out a prior computer simulation of the experimental search for the optimum control. The objective of the control was to minimize the control effort for operating the external thermal regulation device while maintaining a state of thermal comfort (thermoneutrality). GRA

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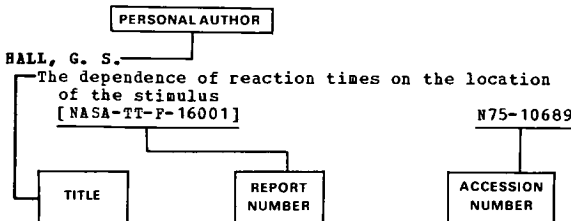
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